Iowa Department of Natural Resources
Land Application of Solid Waste
Additional Sites

Application to add sites to an existing solid waste land application permit must be accompanied by the information required by the applicable solid waste rules under Iowa Administrative Code 567 Chapter 121.

Send completed applications with attached information to Becky.Jolly@dnr.iowa.gov, or:

Iowa Department of Natural Resources
Land Quality Bureau
Solid Waste Section
502 E 9th St
Des Moines, IA 50319-0034

For questions concerning this application please contact the Department at 515-721-7979.

☐ Permit Renewal # 90 -SDP- 15 - 16P -LAN

Section 1. Contact Information

Solid Waste Generator Name: Swift Pork Company Phone: _____

Address: 600 S. Iowa Ave City, State, Zip: Ottumwa, IA 52501

Email: _____ Fax: _____

Section 2. Permit Application Checklist

Checking the appropriate boxes below certifies that the documents submitted in conjunction with this application form are complete and in compliance with the applicable chapters of the Iowa Administrative Code. One (1) copy of each document shall be submitted. If an application is found by the department to be incomplete, it may be denied and returned to the applicant.

Required Documents			Attached
	Document/Information	**Administrative Code**	
Section A	List of all the sites being added. For each site include: • Name of site • Legal description of the site • Total acres in the site • Acres to be used for disposal • Name of landowner or tenant		☐
Section B	Financial Assurance. If the additional site(s) will include additional storage of materials, include a revised cost estimate and proof of financial assurance in the revised amount.	IAC 567 121.8	☐

Required Documents			Attached
	Document/Information	**Administrative Code**	
Section C	Site map or aerial photo of the site showing the following: • The specific area where the material will be applied • Buildings, lakes, ponds, watercourses, wetlands, dry runs, rock outcroppings, roads, and other applicable details. • Soil types and slope • Location of wells *Please remember that the area to be used for land disposal:* • *may not have a slope of greater than 9%,* • *may not be within 200 feet of an occupied residence* • *may not be within 500 feet of a well* ***If the specific area requested includes any of the above the entire field will not be approved.***	IAC 567 121.7(1)"a"(1) IAC 567 121.7(1)"a"(2)	☐
Section D	Soil testing	IAC 567 121.7(1)"a"(9)	☐
Section E	Water table levels	IAC 567121.7(1)"a"(10)	☐
Section F	Review by Soil Conservation District that includes the following: • Soil loss limits applicable to the site • Design soil loss levels for the site • Estimated current soil loss levels *The review may be done by the Natural Resources Conservation Service or a Professional Agronomist in lieu of the Soil Conservation District.*	IAC 567 121.7(1)"a"(3) IAC 567 121.7(1)"a"(6) IAC 567 121.7(1)"a"(7) IAC 567 121.7(1)"a"(8)	☐
Section G	Proof of ownership or legal entitlement to use the site. (Agreement with landowner or tenant) *One document may be submitted for multiple sites with the same landowner or tenant.*	IAC 567 121.7(1)"b"(6)	☐

Section 3. Applicant Certification

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

I further certify that the construction and operation of the above described facility will be in accordance with the plans, specifications, reports and related communications accepted by the Iowa Department of Natural Resources and on file in its office; and in accordance with conditions imposed in the permit issued by the Iowa Department of Natural Resources.

Signature: _____ Date: 9-6-25

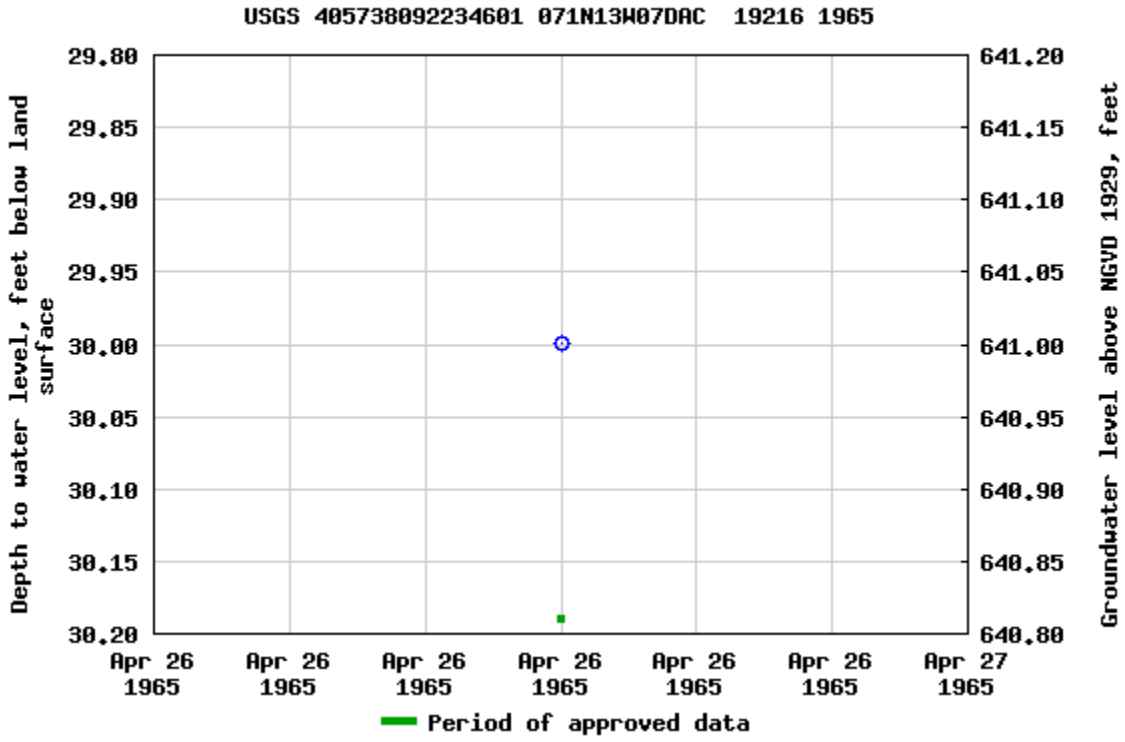
Printed Name: _____ Title: _____

USGS 405738092234601 071N13W07DAC 19216 1965

Available data for this site SUMMARY OF ALL AVAILABLE DATA Groundwater: Field measurements Revisions

Wapello County, Iowa
Hydrologic Unit Code 07100009
Latitude 40°57'38", Longitude 92°23'43" NAD27
Land-surface elevation 671.00 feet above NGVD29
The depth of the well is 169 feet below land surface.
The depth of the hole is 169 feet below land surface.

Output formats
Table of data
Tab-separated data
Graph of data
Reselect period

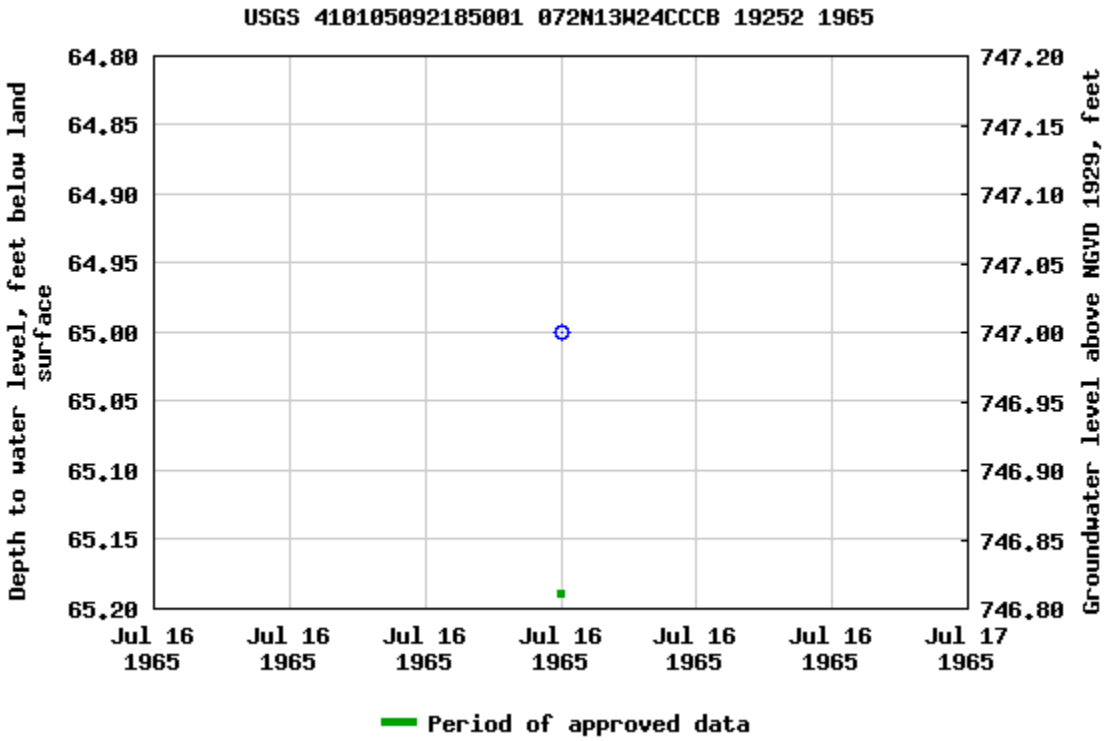


USGS 410105092185001 072N13W24CCCB 19252 1965

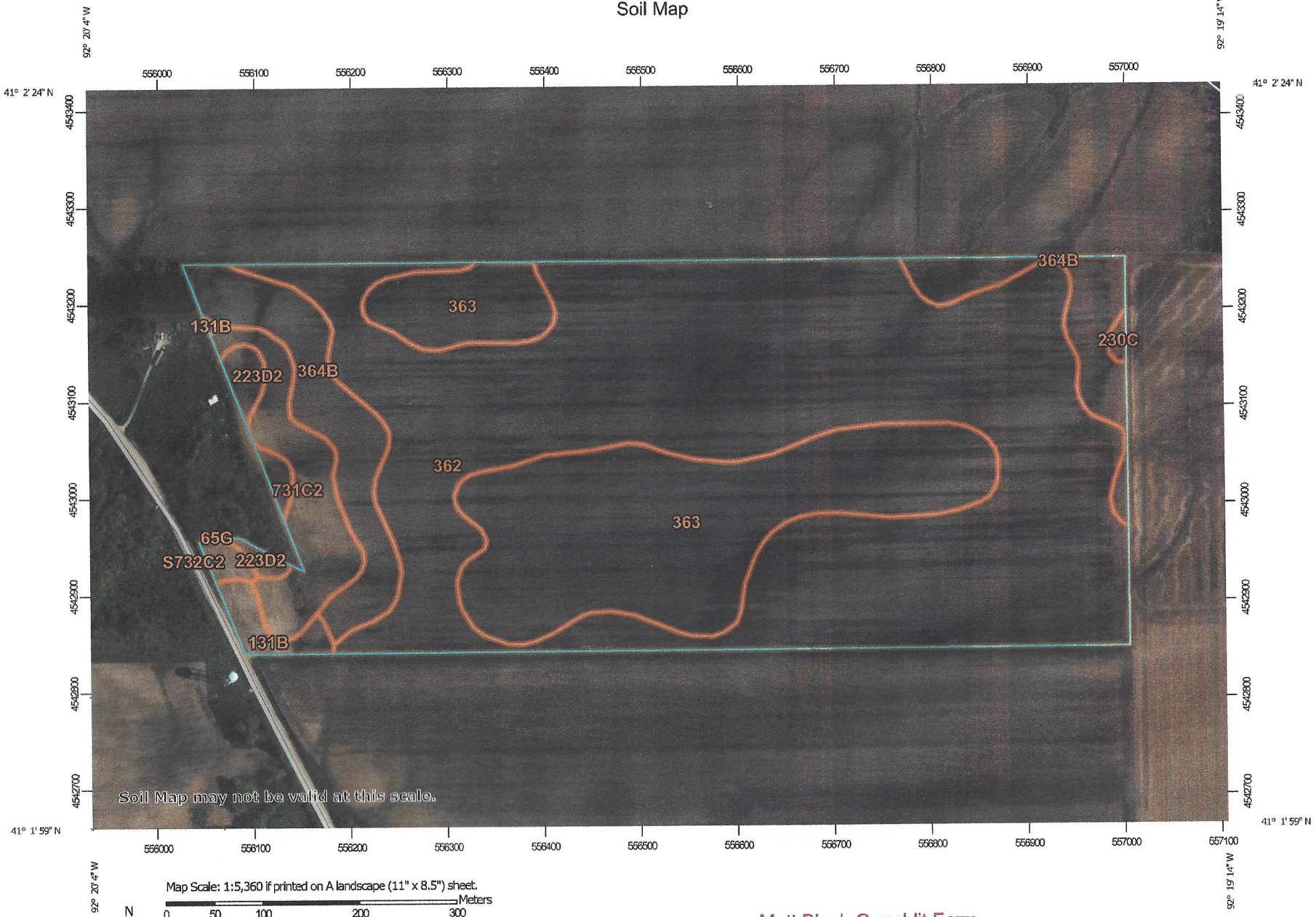
Available data for this site SUMMARY OF ALL AVAILABLE DATA Groundwater: Field measurements Revisions

Wapello County, Iowa
Hydrologic Unit Code 07080107
Latitude 41°01'05", Longitude 92°18'50" NAD27
Land-surface elevation 812.00 feet above NGVD29
The depth of the well is 150 feet below land surface.
The depth of the hole is 150 feet below land surface.

Output formats
Table of data
Tab-separated data
Graph of data
Reselect period



Custom Soil Resource Report
Soil Map



Map Scale: 1:5,360 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Matt Black-Cramblit Farm
92 acres total
91 acres spreadable

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wapello County, Iowa

Matt Black-Cramblit Farm
92 Acres Total

November 20, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:5,360 if printed on A landscape (11" x 8.5") sheet.

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Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Matt Black-Cramblit Farm
92 acres total
91 acres spreadable

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wapello County, Iowa
Survey Area Data: Version 33, Aug 29, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 21, 2021—Nov 24, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
65G	Lindley loam, 25 to 40 percent slopes	0.0	0.0%
131B	Pershing silt loam, 2 to 5 percent slopes	1.1	1.2%
223D2	Rinda silty clay loam, 9 to 14 percent slopes, moderately eroded	1.2	1.3%
230C	Arispe-Clearfield silty clay loams, 5 to 9 percent slopes	0.2	0.2%
362	Haig silt loam, 0 to 2 percent slopes	53.8	58.5%
363	Haig silty clay loam, 0 to 2 percent slopes	21.6	23.5%
364B	Grundy silt loam, 2 to 5 percent slopes	9.3	10.1%
731C2	Pershing silty clay loam, 5 to 9 percent slopes, moderately eroded	4.4	4.7%
S732C2	Weller silty clay loam, 5 to 9 percent slopes, moderately eroded	0.4	0.5%
Totals for Area of Interest		**91.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties

and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Wapello County, Iowa

65G—Lindley loam, 25 to 40 percent slopes

Map Unit Setting

National map unit symbol: 2tk9n
Elevation: 700 to 1,000 feet
Mean annual precipitation: 33 to 38 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 177 to 209 days
Farmland classification: Not prime farmland

Map Unit Composition

Lindley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lindley

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Till

Typical profile

A - 0 to 5 inches: loam
E - 5 to 8 inches: loam
Bt - 8 to 30 inches: clay loam
Bk - 30 to 79 inches: clay loam

Properties and qualities

Slope: 25 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F109XY022MO - Till Exposed Backslope Woodland, F109XY009MO - Till Protected Backslope Forest
Hydric soil rating: No

Minor Components

Munterville

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F109XY013MO - Interbedded Sedimentary Protected Backslope Forest
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: Unranked

Keswick, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F109XY007MO - Till Upland Woodland
Hydric soil rating: No

131B—Pershing silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2vctv
Elevation: 700 to 1,400 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pershing and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pershing

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silt loam
BE - 7 to 12 inches: silty clay loam
Bt - 12 to 55 inches: silty clay
BC - 55 to 79 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 11 to 20 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Pershing, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Belinda

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY001MO - Claypan Summit Prairie
Hydric soil rating: Yes

223D2—Rinda silty clay loam, 9 to 14 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2vcvc
Elevation: 700 to 1,400 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Rinda, moderately eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rinda, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loess over gray paleosol and underlying subglacial till

Typical profile

Ap - 0 to 8 inches: silty clay loam
BE - 8 to 16 inches: silty clay loam
2Btg - 16 to 79 inches: silty clay

Properties and qualities

Slope: 9 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R109XY046MO - Till Upland Savanna
Hydric soil rating: Yes

Minor Components

Bucknell, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R109XY046MO - Till Upland Savanna
Hydric soil rating: No

Rinda, severely eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R109XY046MO - Till Upland Savanna
Hydric soil rating: Yes

230C—Arispe-Clearfield silty clay loams, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: fthc
Elevation: 500 to 1,500 feet
Mean annual precipitation: 34 to 37 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Arispe and similar soils: 60 percent
Clearfield and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arispe

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

H1 - 0 to 7 inches: silty clay loam

H2 - 7 to 26 inches: silty clay loam
H3 - 26 to 39 inches: silty clay loam
H4 - 39 to 60 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Description of Clearfield

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess and underlying gray paleosol

Typical profile

H1 - 0 to 16 inches: silty clay loam
H2 - 16 to 40 inches: silty clay loam
H3 - 40 to 60 inches: clay

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: Yes

Minor Components

Clarinda

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R109XY006MO - Till Upland Prairie
Hydric soil rating: Yes

Colo, frequently flooded

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R109XY029MO - Wet Upland Drainageway Prairie
Hydric soil rating: Yes

362—Haig silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tfyw
Elevation: 660 to 1,100 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 175 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Haig and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haig

Setting

Landform: Flats
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey loess

Typical profile

Ap - 0 to 7 inches: silt loam

Bt - 7 to 13 inches: silty clay loam
Btg - 13 to 38 inches: silty clay
BC - 38 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R109XY001MO - Claypan Summit Prairie
Hydric soil rating: Yes

Minor Components

Edina

Percent of map unit: 10 percent
Landform: Divides
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: R109XY001MO - Claypan Summit Prairie
Hydric soil rating: Yes

363—Haig silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tfyx
Elevation: 660 to 1,100 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 175 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Haig and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haig

Setting

Landform: Flats
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
Bt - 7 to 13 inches: silty clay loam
Btg - 13 to 38 inches: silty clay
BC - 38 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R109XY001MO - Claypan Summit Prairie
Hydric soil rating: Yes

Minor Components

Edina

Percent of map unit: 10 percent
Landform: Divides
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: R109XY001MO - Claypan Summit Prairie
Hydric soil rating: Yes

364B—Grundy silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: fthx
Elevation: 650 to 1,350 feet
Mean annual precipitation: 34 to 37 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Grundy and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Grundy

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loess

Typical profile

H1 - 0 to 12 inches: silty clay loam
H2 - 12 to 16 inches: silty clay loam
H3 - 16 to 36 inches: silty clay
H4 - 36 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Haig

Percent of map unit: 5 percent
Landform: Flats
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R109XY001MO - Claypan Summit Prairie
Hydric soil rating: Yes

Arispe

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

731C2—Pershing silty clay loam, 5 to 9 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2vcv7
Elevation: 700 to 1,400 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Pershing, moderately eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pershing, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 4 inches: silty clay loam

BE - 4 to 12 inches: silty clay loam
Bt - 12 to 55 inches: silty clay
BC - 55 to 79 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 12 to 16 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Rinda, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex, concave
Across-slope shape: Linear, concave
Ecological site: R109XY046MO - Till Upland Savanna
Hydric soil rating: Yes

Pershing, severely eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

S732C2—Weller silty clay loam, 5 to 9 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2tkbk

Elevation: 530 to 1,350 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 174 to 209 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Weller, moderately eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Weller, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
BE - 7 to 18 inches: silty clay loam
Bt1 - 18 to 25 inches: silty clay
Bt2 - 25 to 67 inches: silty clay loam
BC - 67 to 79 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F109XY003MO - Loess Upland Woodland
Hydric soil rating: No

Minor Components

Keswick, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Ecological site: F109XY007MO - Till Upland Woodland
Hydric soil rating: No

Ashgrove, moderately eroded

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F109XY007MO - Till Upland Woodland
Hydric soil rating: Yes

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Iowa Department of Natural Resources

Land Application of Solid Waste
Additional Sites

Application to add sites to an existing solid waste land application permit must be accompanied by the information required by the applicable solid waste rules under Iowa Administrative Code 567 Chapter 121.

Send completed applications with attached information to Becky.Jolly@dnr.iowa.gov, or:
Iowa Department of Natural Resources
Land Quality Bureau
Solid Waste Section
502 E 9th St
Des Moines, IA 50319-0034

For questions concerning this application please contact the Department at 515-721-7979.

☐ Permit Renewal # _____ -SDP- _____ - _____ -LAN

Section 1. Contact Information

Solid Waste Generator Name: _____ Phone: _____

Address: _____ City, State, Zip: _____

Email: _____ Fax: _____

Section 2. Permit Application Checklist

Checking the appropriate boxes below certifies that the documents submitted in conjunction with this application form are complete and in compliance with the applicable chapters of the Iowa Administrative Code. One (1) copy of each document shall be submitted. If an application is found by the department to be incomplete, it may be denied and returned to the applicant.

Required Documents			Attached
	Document/Information	Administrative Code	
Section A	List of all the sites being added. For each site include: • Name of site • Legal description of the site • Total acres in the site • Acres to be used for disposal • Name of landowner or tenant		☐
Section B	Financial Assurance. **If** the additional site(s) will include additional storage of materials, include a revised cost estimate and proof of financial assurance in the revised amount.	IAC 567 121.8	☐

Required Documents			Attached
	Document/Information	**Administrative Code**	
Section C	Site map or aerial photo of the site showing the following: • The specific area where the material will be applied • Buildings, lakes, ponds, watercourses, wetlands, dry runs, rock outcroppings, roads, and other applicable details. • Soil types and slope • Location of wells *Please remember that the area to be used for land disposal:* • *may not have a slope of greater than 9%,* • *may not be within 200 feet of an occupied residence* • *may not be within 500 feet of a well* ***If the specific area requested includes any of the above the entire field will not be approved.***	IAC 567 121.7(1)"a"(1) IAC 567 121.7(1)"a"(2)	☐
Section D	Soil testing	IAC 567 121.7(1)"a"(9)	☐
Section E	Water table levels	IAC 567121.7(1)"a"(10)	☐
Section F	Review by Soil Conservation District that includes the following: • Soil loss limits applicable to the site • Design soil loss levels for the site • Estimated current soil loss levels *The review may be done by the Natural Resources Conservation Service or a Professional Agronomist in lieu of the Soil Conservation District.*	IAC 567 121.7(1)"a"(3) IAC 567 121.7(1)"a"(6) IAC 567 121.7(1)"a"(7) IAC 567 121.7(1)"a"(8)	☐
Section G	Proof of ownership or legal entitlement to use the site. (Agreement with landowner or tenant) *One document may be submitted for multiple sites with the same landowner or tenant.*	IAC 567 121.7(1)"b"(6)	☐

Section 3. Applicant Certification

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

I further certify that the construction and operation of the above described facility will be in accordance with the plans, specifications, reports and related communications accepted by the Iowa Department of Natural Resources and on file in its office; and in accordance with conditions imposed in the permit issued by the Iowa Department of Natural Resources.

Signature: Pat Hamm Date: July 30-24

Printed Name: Pat Hammer Title:

I have reviewed the soil loss limits for this site and they are all within tolerance to apply this solid waste.

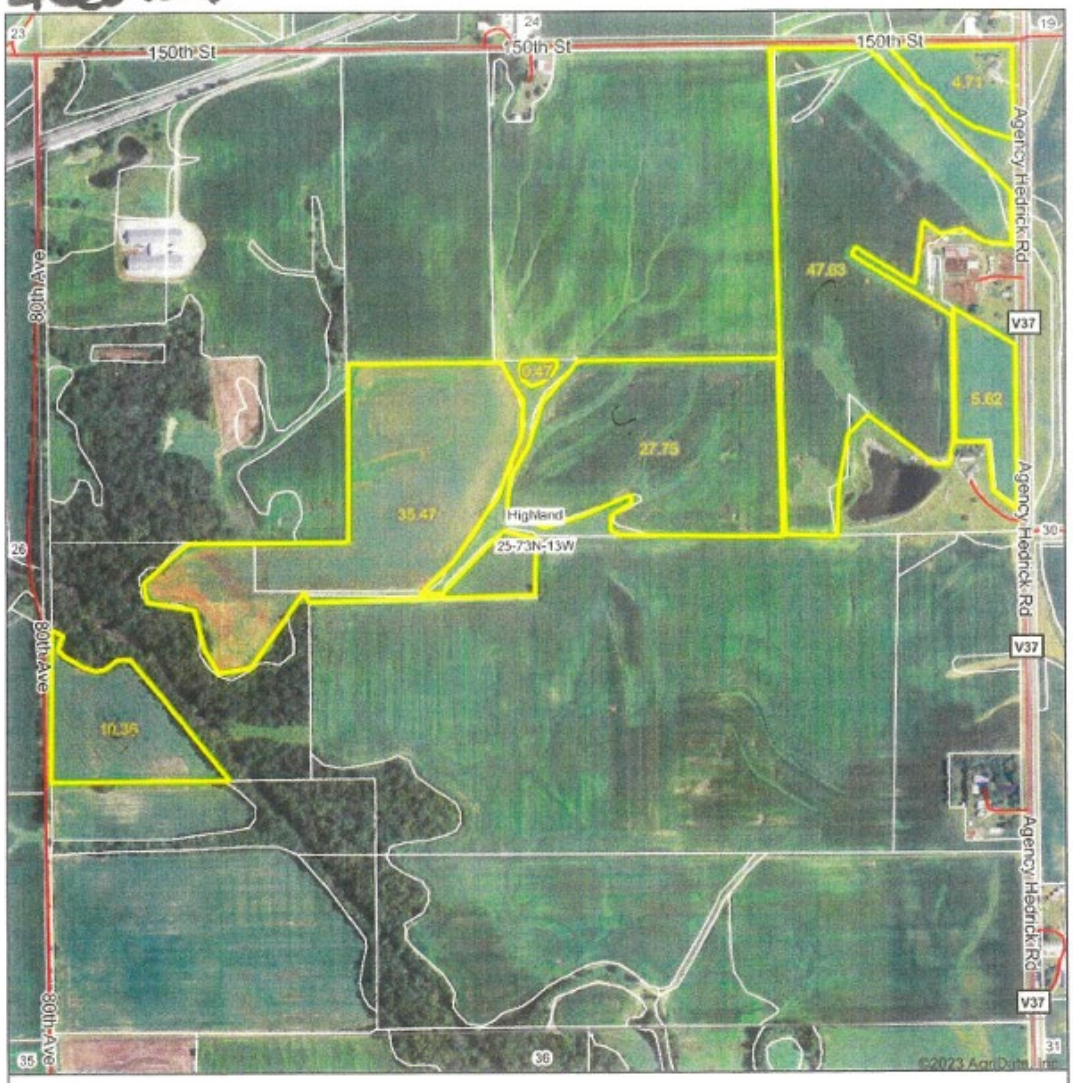
Terry Clark
Division Manager
Southeast Iowa Division
2280 W Tyler Ave. Suite 25
Fairfield, IA 52556
Office: 641-209-5768 Cell 641-777-3103 terry.clark@nutrien.com www.nutrienagsolutions.com

Nutrien Ag Solutions

feedlot

Aerial Map

MAH Black



Map Center: 41° 5' 51.02, -92° 18' 19.32

0ft 812ft 1625ft

25-73N-13W
Wapello County
Iowa

N W E S

2/15/2023

Map Created By surety CUSTOMIZED ONLINE MAPPING

Field borders provided by Farm Service Agency as of 5/21/2008.

Having received the application for application of solid waste on the fields for Matt Black I have determined that they are acceptable for application . The fields in question are and have been in a cropping rotation for several years or in an established pasture situation.

Waypoint ANALYTICAL
"Every acre...Every year"
700 Park Dr, Atlantic, IA 50022
Main 712.243.6933 * Fax 712.243.5213
www.waypointanalytical.com
Nutrien Ag Solutions

SOIL ANALYSIS

Client :	Grower :	
Nutrien Ag Solutions, Inc. (Eldon) Brian Fullenkamp 311 E Main P.O. Box 99 Eldon IA 52554	Matt Black	Report No: 24-264-0539 Cust No: 03000 Date Printed: 09/21/2024 Date Received 09/20/2024 PO: Page : 1 of 7

Lab No: 02316 **Field:** **Sample ID:** Feedlot 1

Test		Results	SOIL TEST RATINGS (Very Low / Low / Medium / Optimum / Very High)
Soil pH	1:1	6.6	
Buffer pH			
Phosphorus (P)	P1	24 ppm	
Potassium (K)	AA	104 ppm	
Calcium (Ca)	AA	2138 ppm	
Magnesium (Mg)	AA	408 ppm	
Sulfur (S)	SO4	10 ppm	
Boron (B)	M3	0.7 ppm	
Copper (Cu)	DTPA	0.9 ppm	
Iron (Fe)	DTPA	54 ppm	
Manganese (Mn)	DTPA	13 ppm	
Zinc (Zn)	DTPA	1.1 ppm	
Sodium (Na)	AA	28 ppm	
Soluble Salts			
Organic Matter	LOI	5.5%	
Estimated N Release		154 lbs/acre	
Nitrate Nitrogen			

Calculated Cation Exchange Capacity		
15.4 meq/100g		
%Saturation		
	%sat	meq
K	1.7	0.3
Ca	69.4	10.7
Mg	22.1	3.4
H	5.8	0.9
Na	0.8	0.1
K/Mg Ratio:	0.08	
Ca/Mg Ratio:	3.14	

SOIL FERTILITY GUIDELINES

Crop : Corn **Yield Goal :** 180 BU **Rec Units:** LB/ACRE

(lbs) LIME (tons)		N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe
0	0	216	57	137	0	4	0.6	2.0	1	0	0

Crop : Soybeans **Yield Goal :** 60 BU **Rec Units:** LB/ACRE

0	0	0	49	142	0	4	1.1	2.0	3	0	0

Comments :

Corn

- Greater N efficiency for corn may be achieved by splitting the N application. Apply 1/4 to 1/3 of the N prior to or at planting and the remainder as sidedress when corn is 8-24 inches high.
- For early planted corn apply a starter fertilizer at least 2 inches from the seed at a rate of 10-20 lbs N/Acre and 30-60 lbs P2O5/Acre.

Soybeans

- For soybeans on soils with a pH of 6.2 or less apply limestone as recommended or plant seed treated with molybdenum. Apply 1-2 oz of sodium molybdate (0.4-0.8 oz of elemental molybdenum) per acre as a seed treatment.
- Soybeans should be inoculated when planted in fields with no soybean production in the past 3 years.

M3 - Mehlich 3 BPH - Lime Index AA - Ammonium Acetate(c) DTPA - DTPA Micros(c) LOI - Loss On Ignition P1 - Weak Bray P(s) 1:1 - Water pH SO4 - SO4 Extractable(c)

Analysis prepared by: Waypoint Analytical Iowa, Inc.

Waypoint ANALYTICAL
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700 Park Dr, Atlantic, IA 50022
Main 712.243.6933 * Fax 712.243.5213
www.waypointanalytical.com
Nutrien Ag Solutions

SOIL ANALYSIS

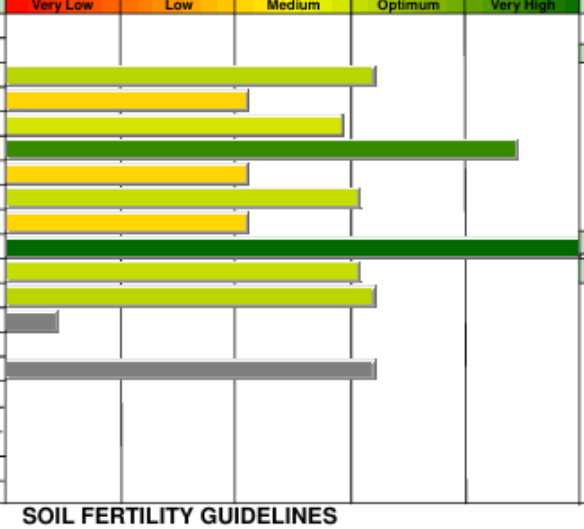
Client :
Nutrien Ag Solutions, Inc. (Eldon)
Brian Fullenkamp
311 E Main
P.O. Box 99
Eldon IA 52554

Grower :
Matt Black

Report No: 24-264-0539
Cust No: 03000
Date Printed: 09/21/2024
Date Received 09/20/2024
PO:
Page : 2 of 7

Lab No: 02317 **Field:** **Sample ID:** Feedlot 2

Test		Results
Soil pH	1:1	6.5
Buffer pH		
Phosphorus (P)	P1	23 ppm
Potassium (K)	AA	93 ppm
Calcium (Ca)	AA	2117 ppm
Magnesium (Mg)	AA	400 ppm
Sulfur (S)	SO4	8 ppm
Boron (B)	M3	0.7 ppm
Copper (Cu)	DTPA	0.9 ppm
Iron (Fe)	DTPA	61 ppm
Manganese (Mn)	DTPA	13 ppm
Zinc (Zn)	DTPA	1.0 ppm
Sodium (Na)	AA	27 ppm
Soluble Salts		
Organic Matter	LOI	5.8%
Estimated N Release		160 lbs/acre
Nitrate Nitrogen		



Calculated Cation Exchange Capacity
15.5 meq/100g

%Saturation	%sat	meq
K	1.5	0.2
Ca	68.3	10.6
Mg	21.5	3.3
H	7.7	1.2
Na	0.8	0.1

K/Mg Ratio: 0.07
Ca/Mg Ratio: 3.18

SOIL FERTILITY GUIDELINES

Crop : Corn **Yield Goal :** 180 BU **Rec Units:** LB/ACRE

(lbs) LIME	(tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe
0	0	216	63	142	0	8	0.6	2.0	1	0.3	0

Crop : Soybeans **Yield Goal :** 60 BU **Rec Units:** LB/ACRE

0	0	0	53	149	0	8	1.1	2.0	3	0.3	0

Comments :

Corn

- Greater N efficiency for corn may be achieved by splitting the N application. Apply 1/4 to 1/3 of the N prior to or at planting and the remainder as sidedress when corn is 8-24 inches high.
- For early planted corn apply a starter fertilizer at least 2 inches from the seed at a rate of 10-20 lbs N/Acre and 30-60 lbs P2O5/Acre.

Soybeans

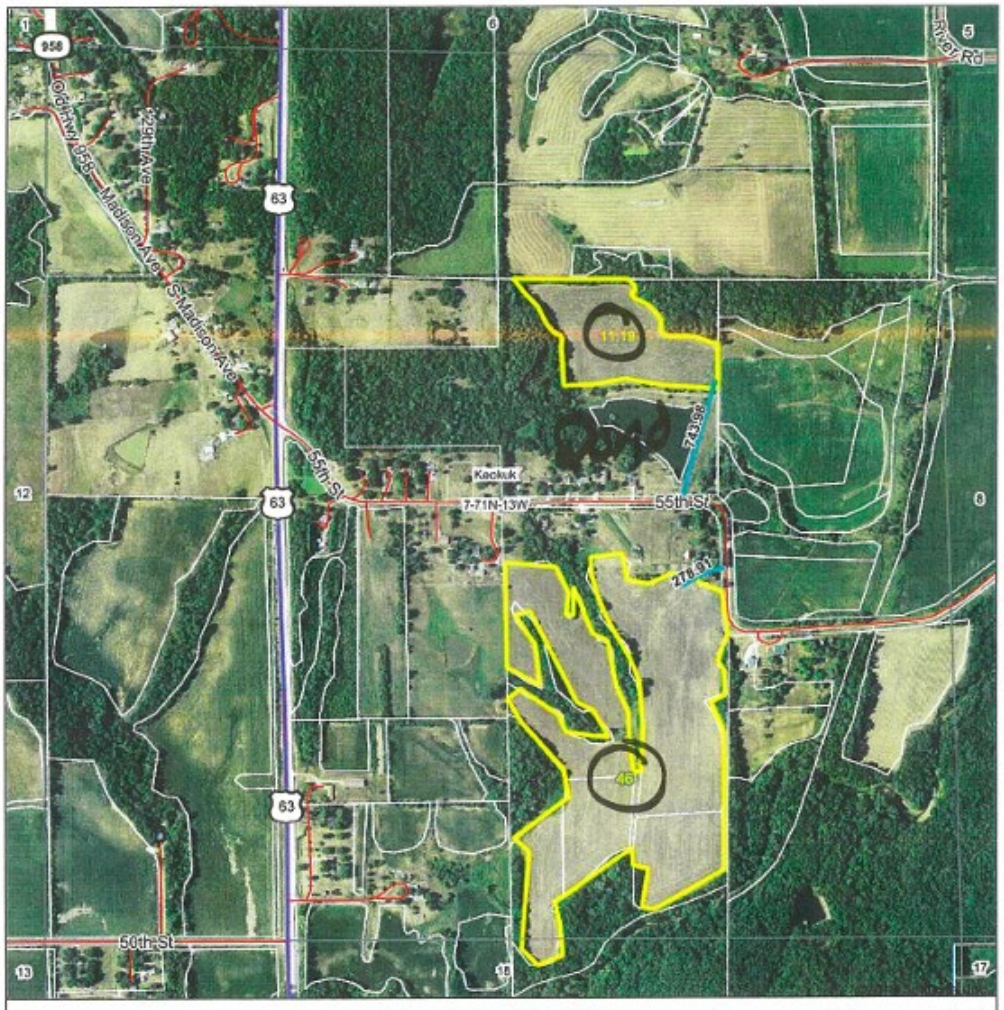
- For soybeans on soils with a pH of 6.2 or less apply limestone as recommended or plant seed treated with molybdenum. Apply 1-2 oz of sodium molybdate (0.4-0.8 oz of elemental molybdenum) per acre as a seed treatment.
- Soybeans should be inoculated when planted in fields with no soybean production in the past 3 years.

M3 - Mehlich 3 BPH - Lime Index AA - Ammonium Acetate(c) DTPA - DTPA Micros(c) LOI - Loss On Ignition P1 - Weak Bray P(s) 1:1 - Water pH SO4 - SO4 Extractable(c)

Analysis prepared by: Waypoint Analytical Iowa, Inc.

Baird Matt Black

Aerial Map



Field borders provided by Farm Service Agency as of 5/21/2008.

58A 1st gravel south of Southern Iowa Diesel on 63 55th - go east

Having received the application for application of solid waste on the fields for Matt Black I have determined that they are acceptable for application . The fields in question are and have been in a cropping rotation for several years or in an established pasture situation.

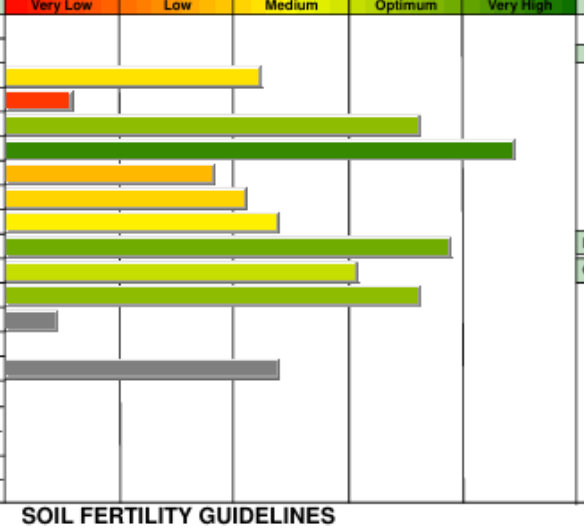
Waypoint ANALYTICAL
"Every acre...Every year"
700 Park Dr, Atlantic, IA 50022
Main 712.243.6933 * Fax 712.243.5213
www.waypointanalytical.com
Nutrien Ag Solutions

SOIL ANALYSIS

Client :	Grower :	
Nutrien Ag Solutions, Inc. (Eldon) Brian Fullenkamp 311 E Main P.O. Box 99 Eldon IA 52554	Matt Black	Report No: 24-264-0539 Cust No: 03000 Date Printed: 09/21/2024 Date Received 09/20/2024 PO: Page : 6 of 7

Lab No: 02322 **Field:** **Sample ID:** Baird

Test		Results	SOIL TEST RATINGS (Very Low / Low / Medium / Optimum / Very High)
Soil pH	1:1	7.3	
Buffer pH			
Phosphorus (P)	P1	17 ppm	
Potassium (K)	AA	34 ppm	
Calcium (Ca)	AA	2011 ppm	
Magnesium (Mg)	AA	340 ppm	
Sulfur (S)	SO4	7 ppm	
Boron (B)	M3	0.4 ppm	
Copper (Cu)	DTPA	1.1 ppm	
Iron (Fe)	DTPA	25 ppm	
Manganese (Mn)	DTPA	14 ppm	
Zinc (Zn)	DTPA	1.3 ppm	
Sodium (Na)	AA	21 ppm	
Soluble Salts			
Organic Matter	LOI	3.7%	
Estimated N Release		118 lbs/acre	
Nitrate Nitrogen			



Calculated Cation Exchange Capacity		
13.1 meq/100g		
%Saturation		
	%sat	meq
K	0.7	0.1
Ca	76.8	10.1
Mg	21.6	2.8
H	0.0	0.0
Na	0.7	0.1
K/Mg Ratio:	0.03	
Ca/Mg Ratio:	3.56	

SOIL FERTILITY GUIDELINES

Crop : Soybeans **Yield Goal :** 50 BU **Rec Units:** LB/ACRE

(lbs) LIME	(tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe
0	0	0	67	137	0	9	1.3	1.5	3	0	0

Crop : Corn **Yield Goal :** 110 BU **Rec Units:** LB/ACRE

0	0	132	65	146	0	9	1.2	1.5	1	0	0

Comments :

Soybeans

- For soybeans on soils with a pH of 6.2 or less apply limestone as recommended or plant seed treated with molybdenum. Apply 1-2 oz of sodium molybdate (0.4-0.8 oz of elemental molybdenum) per acre as a seed treatment.
- Soybeans should be inoculated when planted in fields with no soybean production in the past 3 years.

Corn

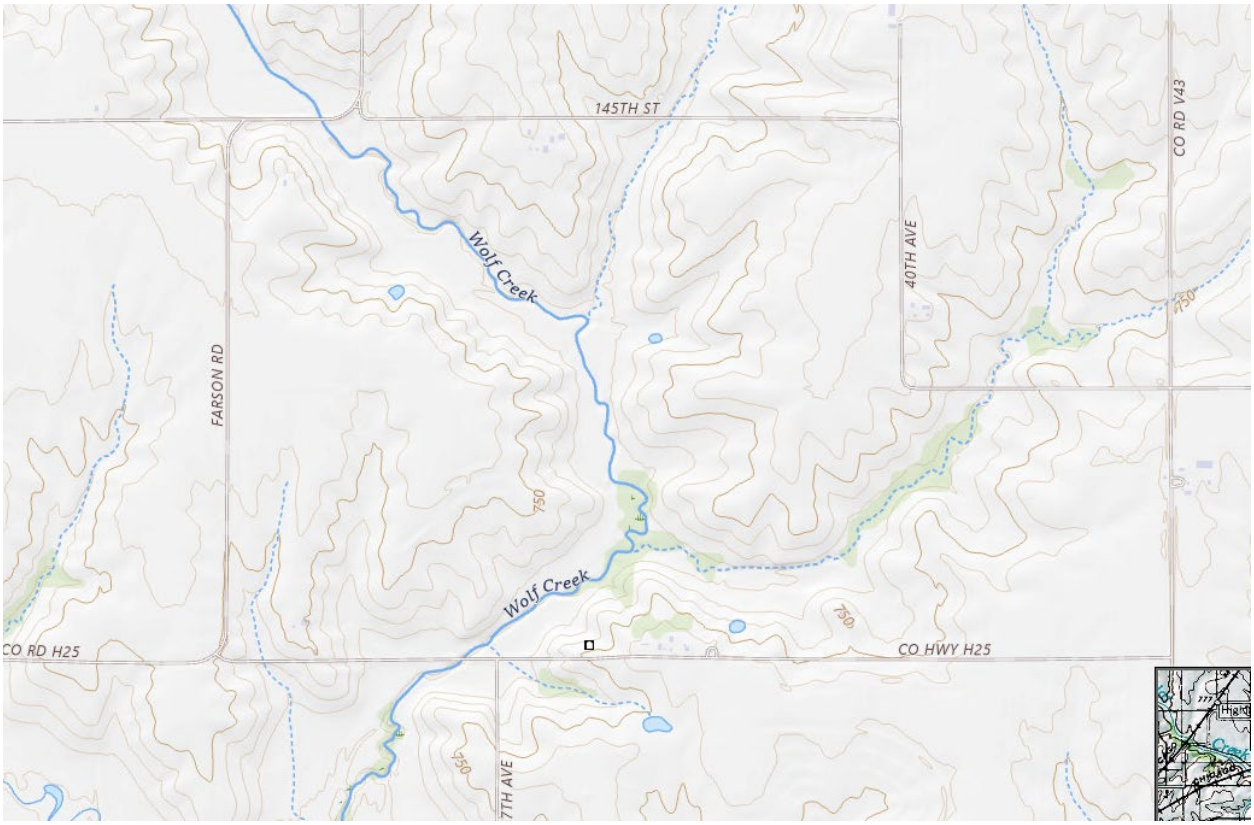
- Greater N efficiency for corn may be achieved by splitting the N application. Apply 1/4 to 1/3 of the N prior to or at planting and the remainder as sidedress when corn is 8-24 inches high.
- For early planted corn apply a starter fertilizer at least 2 inches from the seed at a rate of 10-20 lbs N/Acre and 30-60 lbs P2O5/Acre.

M3 - Mehlich 3 BPH - Lime Index AA - Ammonium Acetate(c) DTPA - DTPA Micros(c) LOI - Loss On Ignition P1 - Weak Bray P(s) 1:1 - Water pH SO4 - SO4 Extractable(c)

Analysis prepared by: Waypoint Analytical Iowa, Inc.

Pat Hammes- McBeth Farm

Groundwater Report from USGS



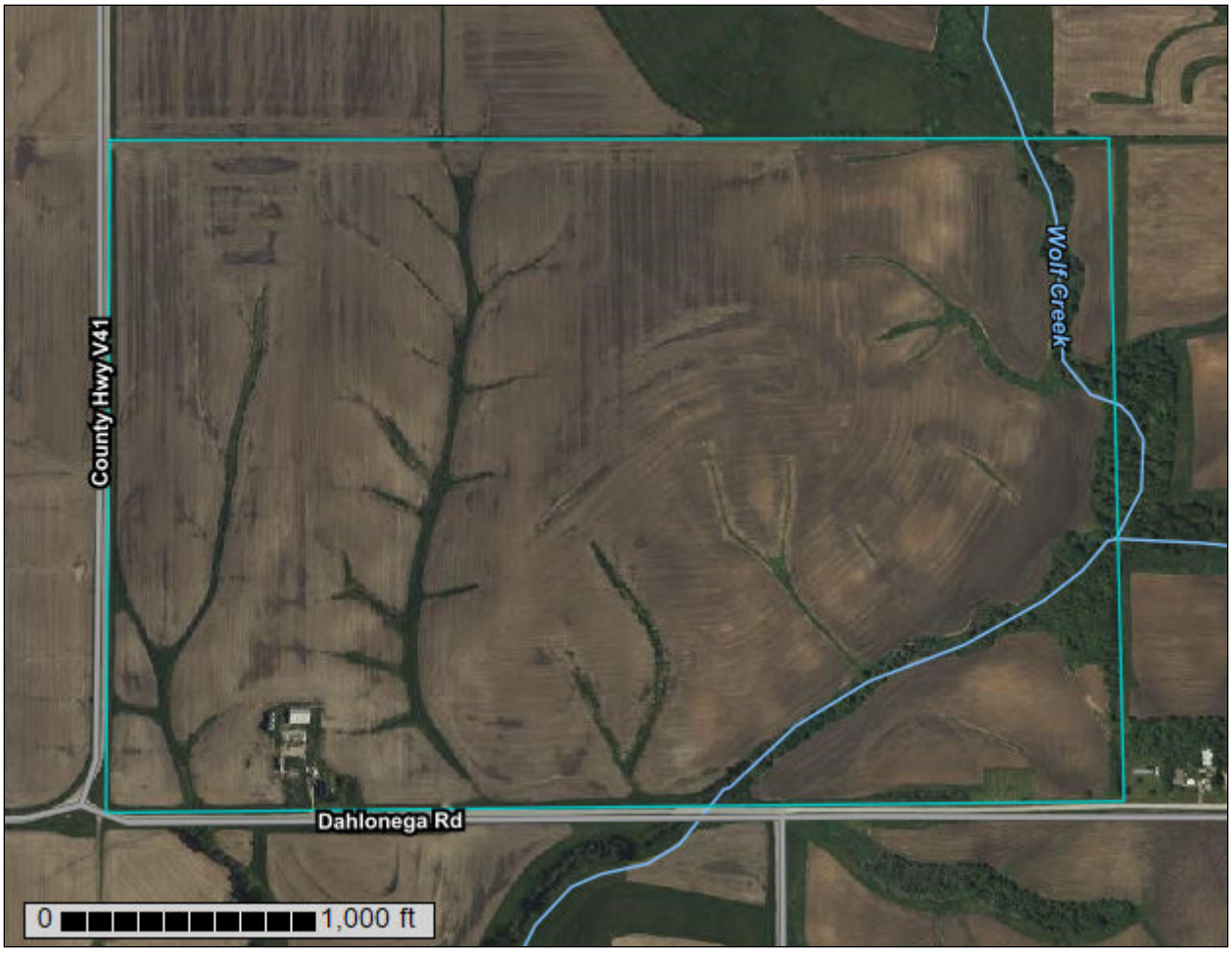
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wapello County, Iowa



June 23, 2025

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

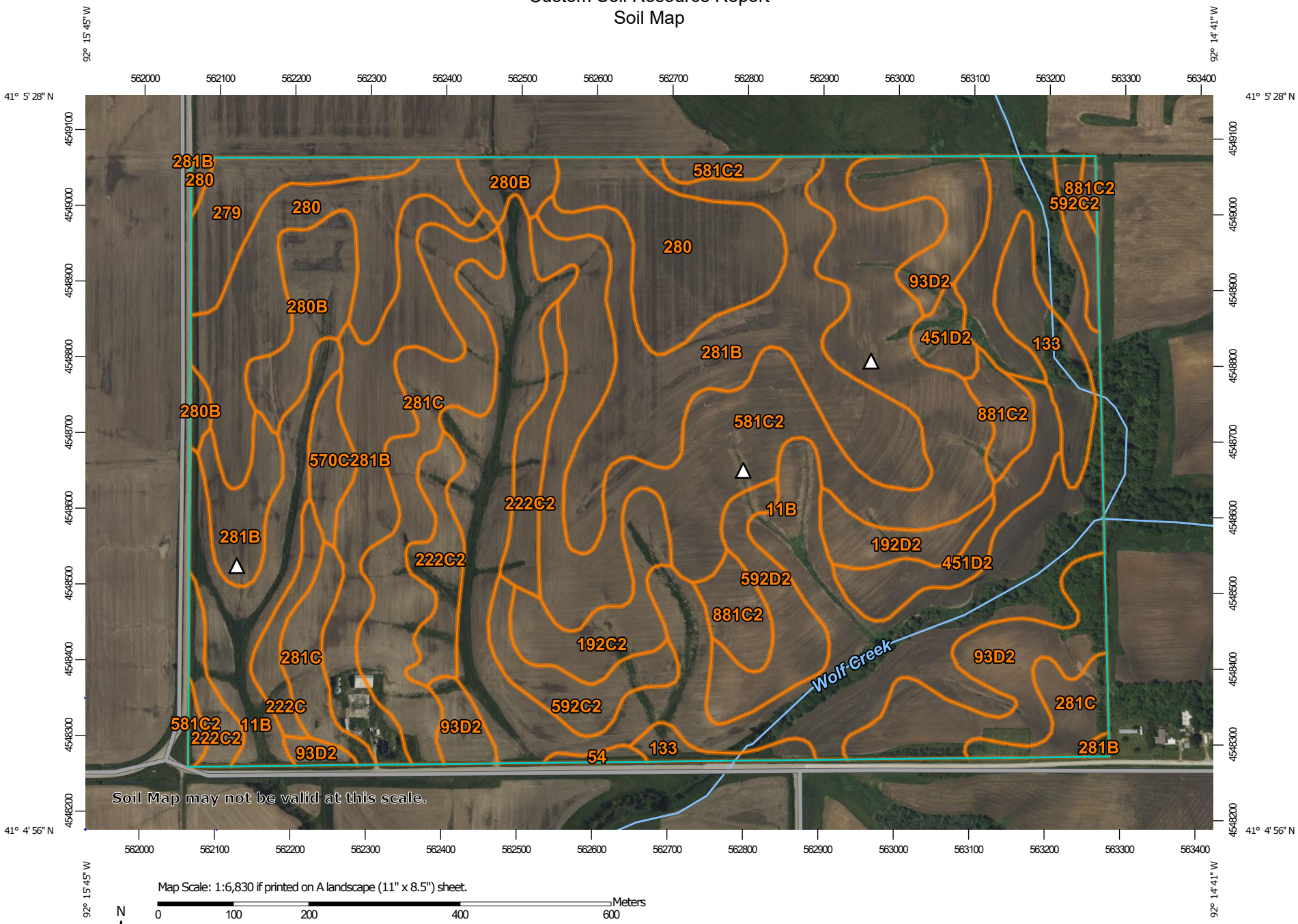
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:6,830 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 300, 600, 1200, 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wapello County, Iowa
Survey Area Data: Version 33, Aug 29, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 21, 2021—Nov 24, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
11B	Colo-Ely complex, 0 to 5 percent slopes	52.4	21.9%
54	Zook silty clay loam, 0 to 2 percent slopes	0.4	0.2%
93D2	Shelby-Adair complex, 9 to 14 percent slopes, moderately eroded	15.9	6.6%
133	Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded	5.8	2.4%
192C2	Adair clay loam, 5 to 9 percent slopes, moderately eroded	5.4	2.2%
192D2	Adair clay loam, 9 to 14 percent slopes, moderately eroded	2.9	1.2%
222C	Clarinda silty clay loam, 5 to 9 percent slopes	2.2	0.9%
222C2	Clarinda silty clay loam, 5 to 9 percent slopes, moderately eroded	8.7	3.6%
279	Taintor silty clay loam, 0 to 2 percent slopes	4.9	2.1%
280	Mahaska silty clay loam, 0 to 2 percent slopes	22.1	9.2%
280B	Mahaska silty clay loam, 2 to 5 percent slopes	7.7	3.2%
281B	Otley silty clay loam, 2 to 5 percent slopes	35.9	15.0%
281C	Otley silty clay loam, 5 to 9 percent slopes	17.9	7.5%
451D2	Caleb loam, 7 to 14 percent slopes, moderately eroded	6.3	2.6%
570C	Nira silty clay loam, 5 to 9 percent slopes	2.1	0.9%
581C2	Otley-Nira silty clay loams, 5 to 9 percent slopes, moderately eroded	33.5	14.0%
592C2	Mystic silt loam, 5 to 9 percent slopes, moderately eroded	5.4	2.3%
592D2	Mystic silt loam, 9 to 14 percent slopes, moderately eroded	5.2	2.2%
881C2	Otley silty clay loam, terrace, 5 to 9 percent slopes, eroded	4.8	2.0%
Totals for Area of Interest		**239.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Wapello County, Iowa

11B—Colo-Ely complex, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3dx
Elevation: 560 to 1,190 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 46 to 51 degrees F
Frost-free period: 149 to 179 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Colo and similar soils: 50 percent
Ely and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colo

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silty clay loam
A1 - 8 to 14 inches: silty clay loam
A2 - 14 to 34 inches: silty clay loam
BA - 34 to 40 inches: silty clay loam
Bg - 40 to 46 inches: silty clay loam
BCg - 46 to 52 inches: silty clay loam
Cg - 52 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R108XC519IA - Wet Upland Drainageway Prairie

Hydric soil rating: Yes

Description of Ely

Setting

Landform: Alluvial fans, drainageways
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Convex, linear
Parent material: Silty colluvium

Typical profile

Ap - 0 to 8 inches: silty clay loam
A - 8 to 24 inches: silty clay loam
BA - 24 to 32 inches: silty clay loam
Bg - 32 to 47 inches: silty clay loam
BCg - 47 to 58 inches: silty clay loam
Cg - 58 to 79 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 12 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: R108XC519IA - Wet Upland Drainageway Prairie
Hydric soil rating: No

Minor Components

Judson

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R108XC519IA - Wet Upland Drainageway Prairie
Hydric soil rating: No

Colo, frequently flooded

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope

Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R108XC519IA - Wet Upland Drainageway Prairie
Hydric soil rating: Yes

54—Zook silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: ftjj
Elevation: 500 to 1,400 feet
Mean annual precipitation: 34 to 37 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Zook, occasionally flooded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zook, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium

Typical profile

Ap - 0 to 7 inches: silty clay loam
A1,A2 - 7 to 20 inches: silty clay loam
A3,A4 - 20 to 38 inches: silty clay
Bg,BCg - 38 to 61 inches: silty clay loam
Cg - 61 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R109XY031MO - Wet Floodplain Prairie
Hydric soil rating: Yes

Minor Components

Colo, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC527IA - Wet Floodplain Sedge Meadow
Hydric soil rating: Yes

93D2—Shelby-Adair complex, 9 to 14 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2tkbw
Elevation: 650 to 1,500 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Shelby, moderately eroded, and similar soils: 45 percent
Adair, moderately eroded, and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Shelby, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Subglacial till

Typical profile

Ap - 0 to 9 inches: loam
Bt - 9 to 38 inches: clay loam
Btk - 38 to 60 inches: clay loam
BCk - 60 to 79 inches: clay loam

Properties and qualities

Slope: 9 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R109XY008MO - Till Backslope Savanna
Hydric soil rating: No

Description of Adair, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over underlying red paleosol developed in subglacial till

Typical profile

Ap - 0 to 8 inches: clay loam
2Bt1 - 8 to 17 inches: clay
2Bt2 - 17 to 51 inches: clay loam
2Bk - 51 to 68 inches: clay loam
2C - 68 to 79 inches: clay loam

Properties and qualities

Slope: 9 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 12 to 16 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C/D

Ecological site: R109XY006MO - Till Upland Prairie
Hydric soil rating: No

Minor Components

Shelby, severely eroded
Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY008MO - Till Backslope Savanna
Hydric soil rating: No

Clarinda, moderately eroded
Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R109XY006MO - Till Upland Prairie
Hydric soil rating: Yes

Olmitz
Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

133—Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting
National map unit symbol: 2t3dt
Elevation: 520 to 1,240 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 150 to 179 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition
Colo, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colo, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silty clay loam
A1 - 8 to 14 inches: silty clay loam
A2, A3 - 14 to 34 inches: silty clay loam
BA - 34 to 40 inches: silty clay loam
Bg - 40 to 46 inches: silty clay loam
BCg - 46 to 52 inches: silty clay loam
Cg - 52 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R108XC527IA - Wet Floodplain Sedge Meadow
Hydric soil rating: Yes

Minor Components

Zook, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC527IA - Wet Floodplain Sedge Meadow
Hydric soil rating: Yes

Ely

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R108XC519IA - Wet Upland Drainageway Prairie
Hydric soil rating: No

192C2—Adair clay loam, 5 to 9 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: fth0
Elevation: 700 to 1,350 feet
Mean annual precipitation: 34 to 37 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Adair, moderately eroded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Adair, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Red paleosol and underlying subglacial till

Typical profile

H1 - 0 to 7 inches: clay loam
H2 - 7 to 43 inches: clay
H3 - 43 to 60 inches: clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R108XC509IA - Till Backslope Prairie
Hydric soil rating: No

Minor Components

Rinda, moderately eroded
Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC512IA - Till Backslope Seep Savanna
Hydric soil rating: Yes

192D2—Adair clay loam, 9 to 14 percent slopes, moderately eroded

Map Unit Setting
National map unit symbol: fth2
Elevation: 650 to 1,500 feet
Mean annual precipitation: 34 to 37 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Adair, moderately eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Adair, Moderately Eroded

Setting
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Red paleosol and underlying subglacial till

Typical profile
H1 - 0 to 7 inches: clay loam
H2 - 7 to 43 inches: clay
H3 - 43 to 60 inches: clay loam

Properties and qualities
Slope: 9 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained

Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R108XC509IA - Till Backslope Prairie
Hydric soil rating: No

Minor Components

Clarinda, moderately eroded
Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC510IA - Till Backslope Seepage Meadow
Hydric soil rating: Yes

Shelby, moderately eroded
Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R108XC509IA - Till Backslope Prairie
Hydric soil rating: No

222C—Clarinda silty clay loam, 5 to 9 percent slopes

Map Unit Setting
National map unit symbol: 2tfyy
Elevation: 650 to 1,500 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Clarinda and similar soils: 85 percent

Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clarinda

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Clayey loess over gray paleosol and underlying subglacial till

Typical profile

Ap - 0 to 8 inches: silty clay loam
A - 8 to 11 inches: silty clay loam
2Bt - 11 to 19 inches: silty clay
2Btg - 19 to 67 inches: silty clay
2BC - 67 to 79 inches: silty clay

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: 9 to 13 inches to abrupt textural change
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: R109XY006MO - Till Upland Prairie
Hydric soil rating: Yes

Minor Components

Clearfield

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC510IA - Till Backslope Seepage Meadow
Hydric soil rating: Yes

Clarinda, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope

Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R109XY006MO - Till Upland Prairie
Hydric soil rating: Yes

222C2—Clarinda silty clay loam, 5 to 9 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2tfyz
Elevation: 650 to 1,500 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Clarinda, moderately eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clarinda, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Clayey loess over gray paleosol and underlying subglacial till

Typical profile

Ap - 0 to 8 inches: silty clay loam
2Bt - 8 to 16 inches: silty clay
2Btg - 16 to 67 inches: silty clay
2BC - 67 to 79 inches: silty clay

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: R109XY006MO - Till Upland Prairie
Hydric soil rating: Yes

Minor Components

Clearfield

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC510IA - Till Backslope Seepage Meadow
Hydric soil rating: Yes

Clarinda, severely eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R109XY006MO - Till Upland Prairie
Hydric soil rating: Yes

279—Taintor silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t3bp
Elevation: 640 to 990 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 175 to 205 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Taintor and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Taintor

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 9 inches: silty clay loam
A1 - 9 to 16 inches: silty clay loam
A2 - 16 to 20 inches: silty clay loam
Btg1 - 20 to 24 inches: silty clay
Btg2 - 24 to 28 inches: silty clay
Btg3 - 28 to 36 inches: silty clay loam
Btg4 - 36 to 46 inches: silty clay loam
Cg - 46 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: Yes

Minor Components

Mahaska

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: No

Sperry

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC515IA - Ponded Upland Depression Sedge Meadow
Hydric soil rating: Yes

280—Mahaska silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t3bs
Elevation: 530 to 990 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 175 to 205 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Mahaska and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mahaska

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
A1 - 7 to 13 inches: silty clay loam
A2 - 13 to 18 inches: silty clay loam
BA - 18 to 24 inches: silty clay loam
Bt - 24 to 30 inches: silty clay loam
Btg1 - 30 to 40 inches: silty clay loam
Btg2 - 40 to 61 inches: silty clay loam
BCg - 61 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 12 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C/D
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: No

Minor Components

Taintor

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: Yes

280B—Mahaska silty clay loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3bt
Elevation: 610 to 910 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 50 to 51 degrees F
Frost-free period: 180 to 205 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Mahaska and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mahaska

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
A1 - 7 to 13 inches: silty clay loam
A2 - 13 to 18 inches: silty clay loam
BA - 18 to 24 inches: silty clay loam
Bt - 24 to 30 inches: silty clay loam
Btg1 - 30 to 40 inches: silty clay loam
Btg2 - 40 to 61 inches: silty clay loam

BCg - 61 to 79 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 12 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: No

Minor Components

Taintor

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: Yes

Otley

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

281B—Otley silty clay loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2rlzx
Elevation: 620 to 980 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 49 to 52 degrees F

Frost-free period: 170 to 205 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Otley and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otley

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
A - 7 to 17 inches: silty clay loam
Bt1 - 17 to 26 inches: silty clay loam
Bt2 - 26 to 32 inches: silty clay loam
Bt3 - 32 to 40 inches: silty clay loam
Btg1 - 40 to 46 inches: silty clay loam
Btg2 - 46 to 53 inches: silty clay loam
Btg3 - 53 to 61 inches: silty clay loam
Cg1 - 61 to 73 inches: silty clay loam
Cg2 - 73 to 79 inches: silt loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 8 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Mahaska

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: No

281C—Otley silty clay loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2t3bx
Elevation: 670 to 970 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 175 to 205 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Otley and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otley

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
A - 7 to 17 inches: silty clay loam
Bt1 - 17 to 26 inches: silty clay loam
Bt2 - 26 to 32 inches: silty clay loam
Bt3 - 32 to 40 inches: silty clay loam
Btg1 - 40 to 46 inches: silty clay loam
Btg2 - 46 to 53 inches: silty clay loam
Btg3 - 53 to 61 inches: silty clay loam
Cg1 - 61 to 73 inches: silty clay loam
Cg2 - 73 to 79 inches: silt loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)

Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 8 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Otley, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Clearfield

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC510IA - Till Backslope Seepage Meadow
Hydric soil rating: Yes

451D2—Caleb loam, 7 to 14 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: ftj8
Elevation: 550 to 1,400 feet
Mean annual precipitation: 34 to 37 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Caleb, moderately eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caleb, Moderately Eroded

Setting

Landform: Stream terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Alluvial sediments derived from till

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 36 inches: clay loam
H3 - 36 to 72 inches: sandy clay loam

Properties and qualities

Slope: 7 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

Minor Components

Ladoga, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R108XC504IA - Loess Upland Savanna
Hydric soil rating: No

Mystic, moderately eroded

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R108XC511IA - Till Backslope Savanna
Hydric soil rating: No

Pershing, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

570C—Nira silty clay loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: ftjl
Elevation: 650 to 1,350 feet
Mean annual precipitation: 33 to 38 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Nira and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nira

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

H1 - 0 to 12 inches: silty clay loam
H2 - 12 to 42 inches: silty clay loam
H3 - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Otley

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

581C2—Otley-Nira silty clay loams, 5 to 9 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: ftjm
Elevation: 650 to 1,500 feet
Mean annual precipitation: 33 to 38 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Otley, moderately eroded, and similar soils: 60 percent
Nira, moderately eroded, and similar soils: 35 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otley, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

Ap - 0 to 8 inches: silty clay loam
Bt, Btg - 8 to 56 inches: silty clay loam

BCg, Cg - 56 to 80 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Description of Nira, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

H1 - 0 to 12 inches: silty clay loam
H2 - 12 to 42 inches: silty clay loam
H3 - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Clarinda, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC510IA - Till Backslope Seepage Meadow
Hydric soil rating: Yes

592C2—Mystic silt loam, 5 to 9 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: ftjs
Elevation: 550 to 1,400 feet
Mean annual precipitation: 34 to 37 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Mystic, moderately eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mystic, Moderately Eroded

Setting

Landform: Stream terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Alluvial sediments derived from till

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 51 inches: clay
H3 - 51 to 65 inches: sandy clay loam
H4 - 65 to 69 inches: stratified sandy loam to clay

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: 2 to 4 inches to abrupt textural change
Drainage class: Somewhat poorly drained
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

Minor Components

Caleb, moderately eroded

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R108XC511IA - Till Backslope Savanna
Hydric soil rating: No

Ladoga

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R108XC504IA - Loess Upland Savanna
Hydric soil rating: No

Pershing

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

592D2—Mystic silt loam, 9 to 14 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2wjf5
Elevation: 660 to 980 feet

Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Mystic, moderately eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mystic, Moderately Eroded

Setting

Landform: Stream terraces
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Alluvial sediments derived from till

Typical profile

Ap - 0 to 6 inches: silt loam
BE - 6 to 9 inches: clay loam
Bt1 - 9 to 30 inches: clay loam
Bt2 - 30 to 54 inches: clay loam
BC - 54 to 63 inches: clay loam
C - 63 to 79 inches: stratified sandy loam to loam to clay loam

Properties and qualities

Slope: 9 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 12 to 16 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C/D
Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

Minor Components

Caleb, moderately eroded

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear

Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

Pershing, moderately eroded
Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY036MO - Wet Loess High Terrace Savanna
Hydric soil rating: No

881C2—Otley silty clay loam, terrace, 5 to 9 percent slopes, eroded

Map Unit Setting
National map unit symbol: 2t3c2
Elevation: 660 to 900 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Otley, moderately eroded, terrace, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otley, Moderately Eroded, Terrace

Setting
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess

Typical profile
Ap - 0 to 8 inches: silty clay loam
Bt1 - 8 to 17 inches: silty clay loam
Bt2 - 17 to 23 inches: silty clay loam
Bt3 - 23 to 31 inches: silty clay loam
Btg1 - 31 to 37 inches: silty clay loam
Btg2 - 37 to 44 inches: silty clay loam
Btg3 - 44 to 52 inches: silty clay loam
Cg1 - 52 to 64 inches: silty clay loam
Cg2 - 64 to 79 inches: silt loam

Properties and qualities
Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 8 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Otley, severely eroded, terrace

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

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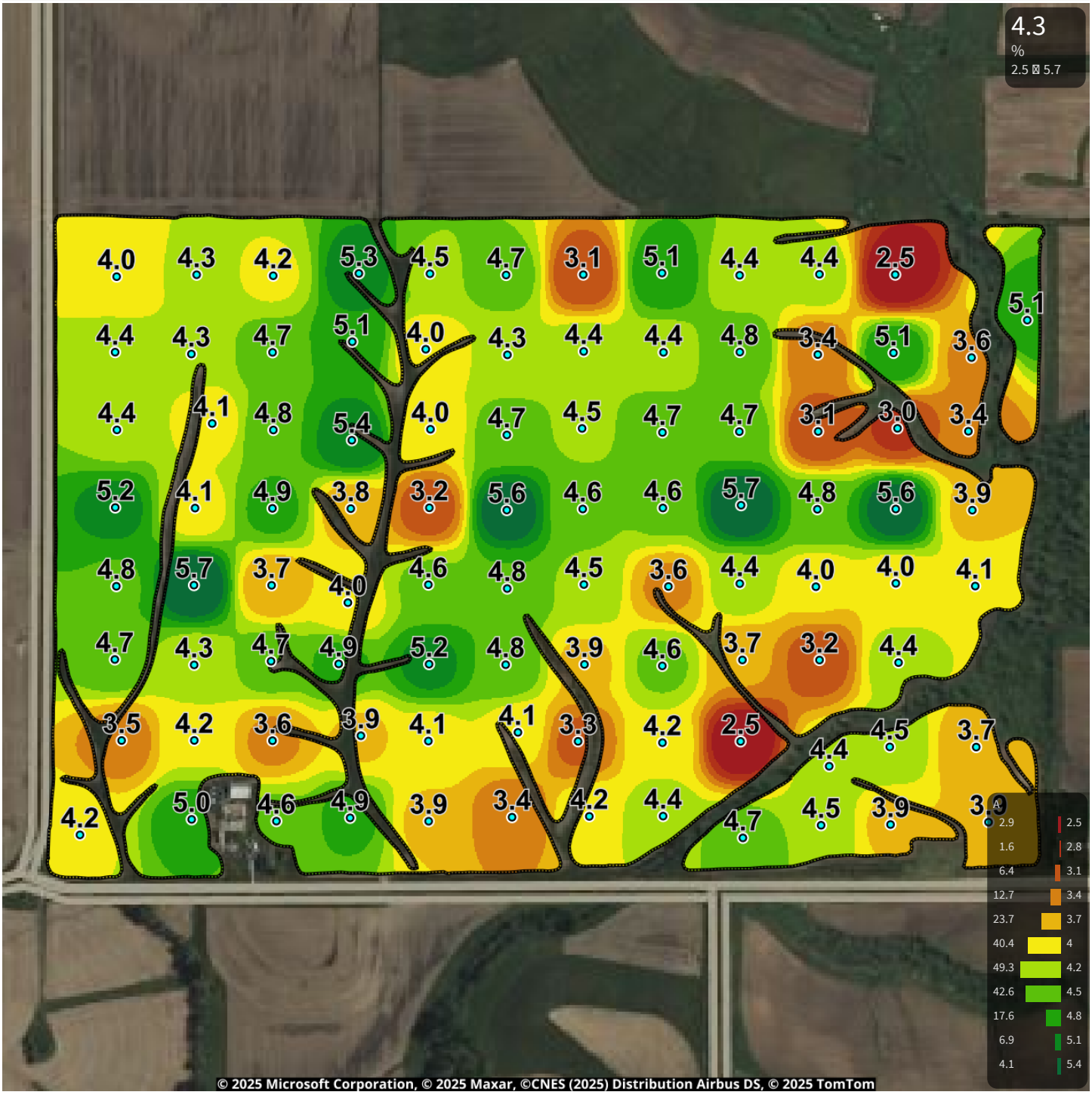
Lab Results Map

Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

OM **Organic Matter** (%)

0 - 6 in



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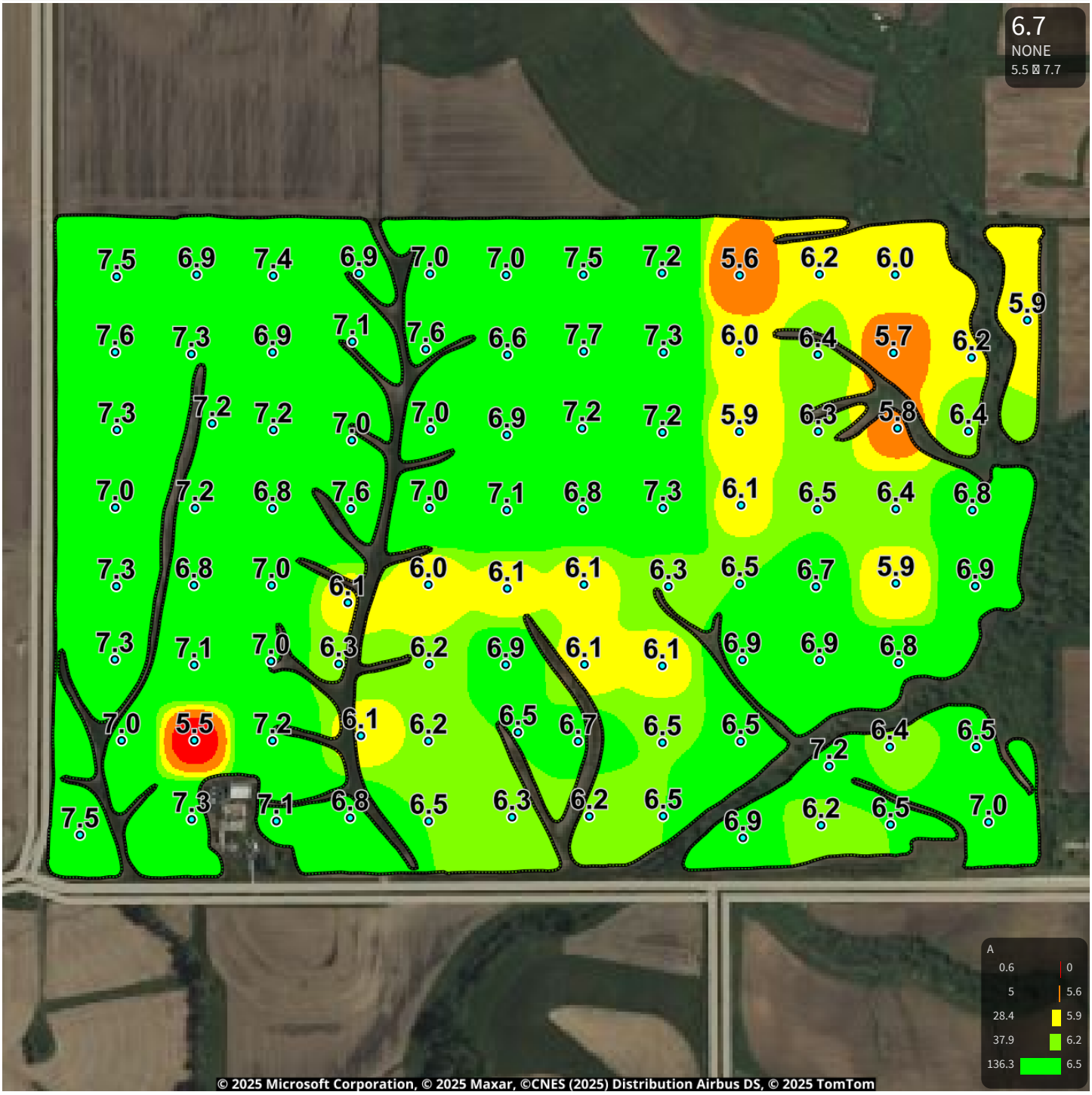
Lab Results Map

Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

pH **pH** (none) 0 - 6 in



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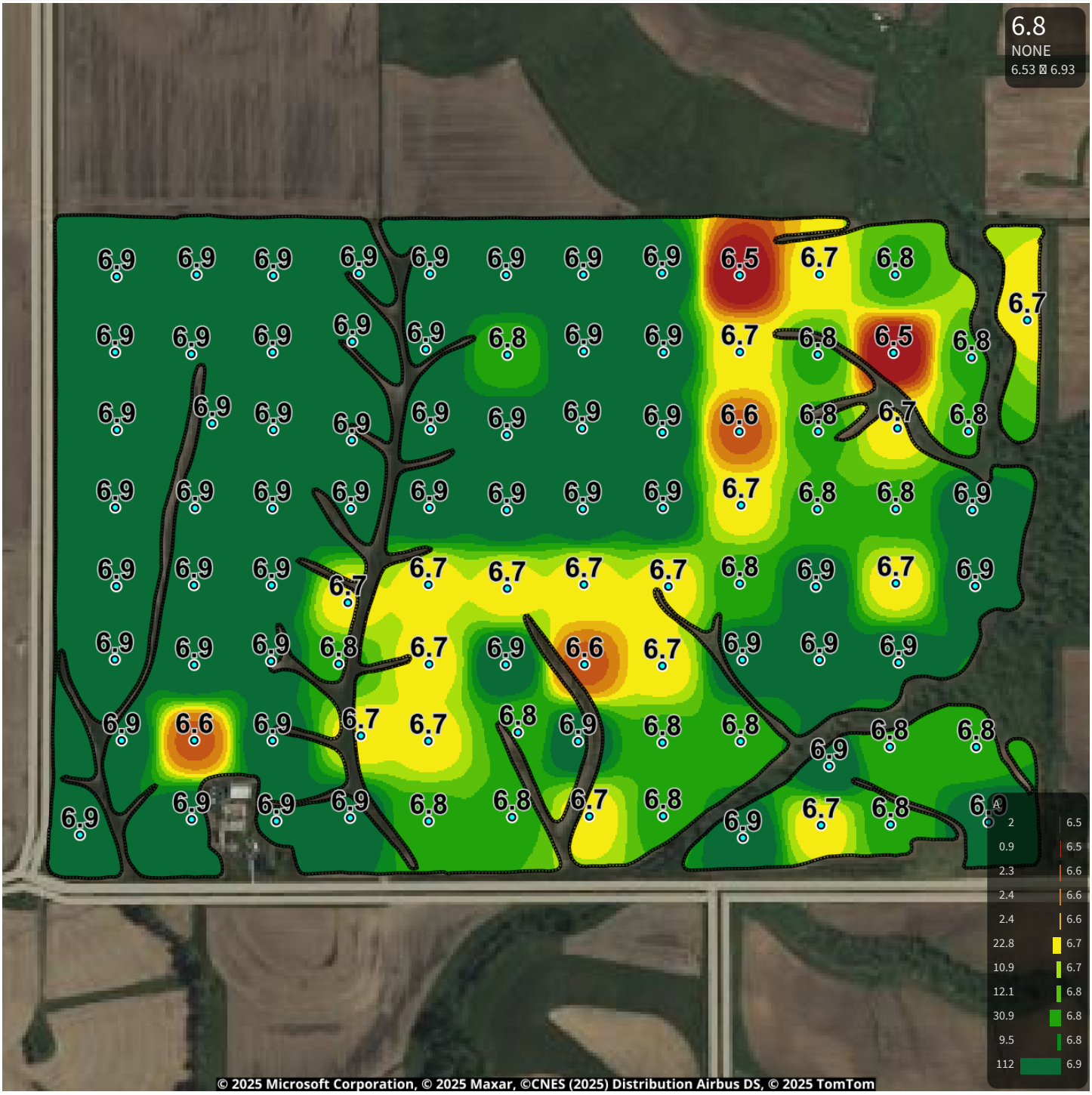
Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

BpH **Buffer pH** (none)

0 - 6 in



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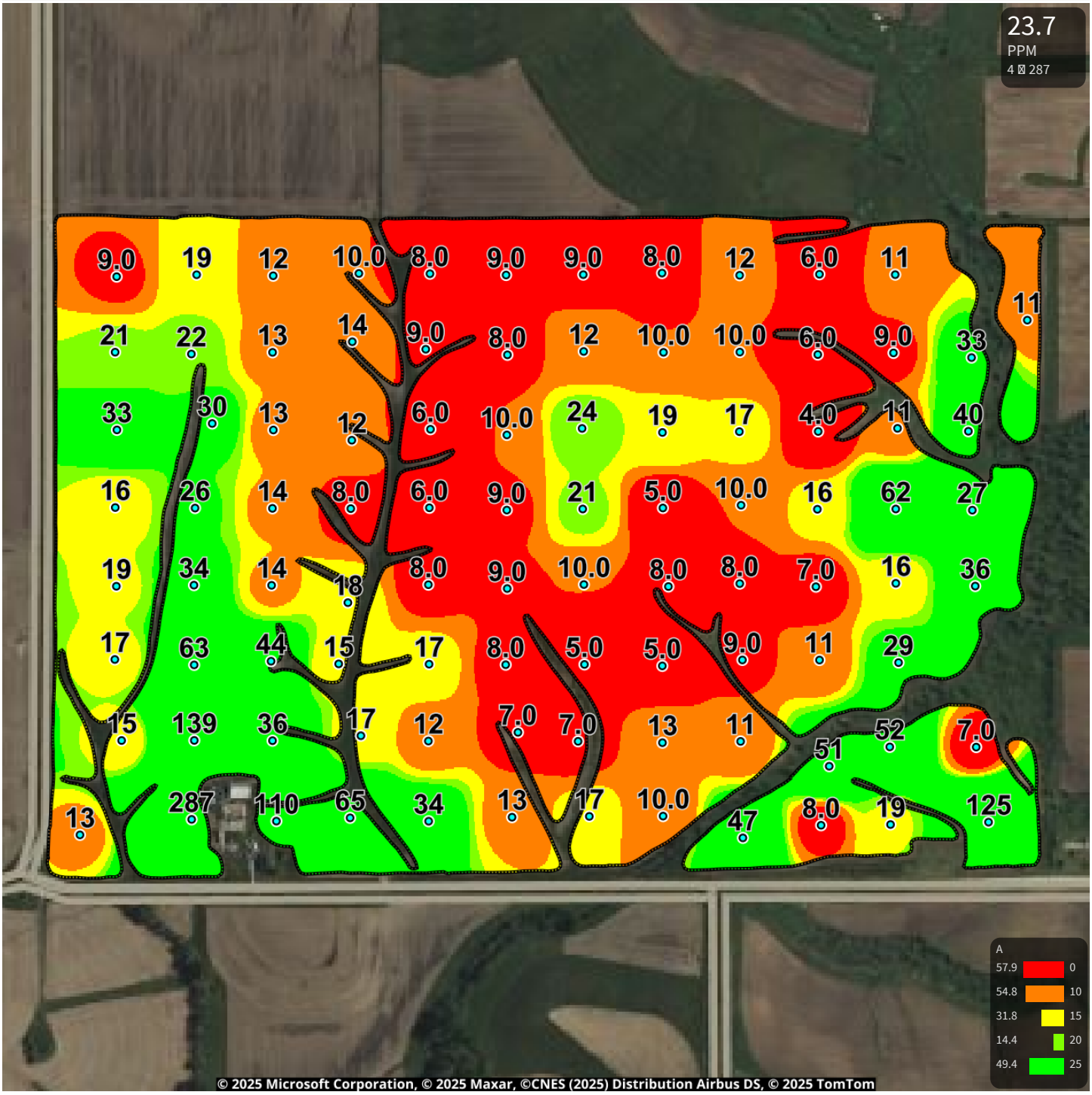
Lab Results Map

Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

P **Phosphorus** (ppm) 0 - 6 in



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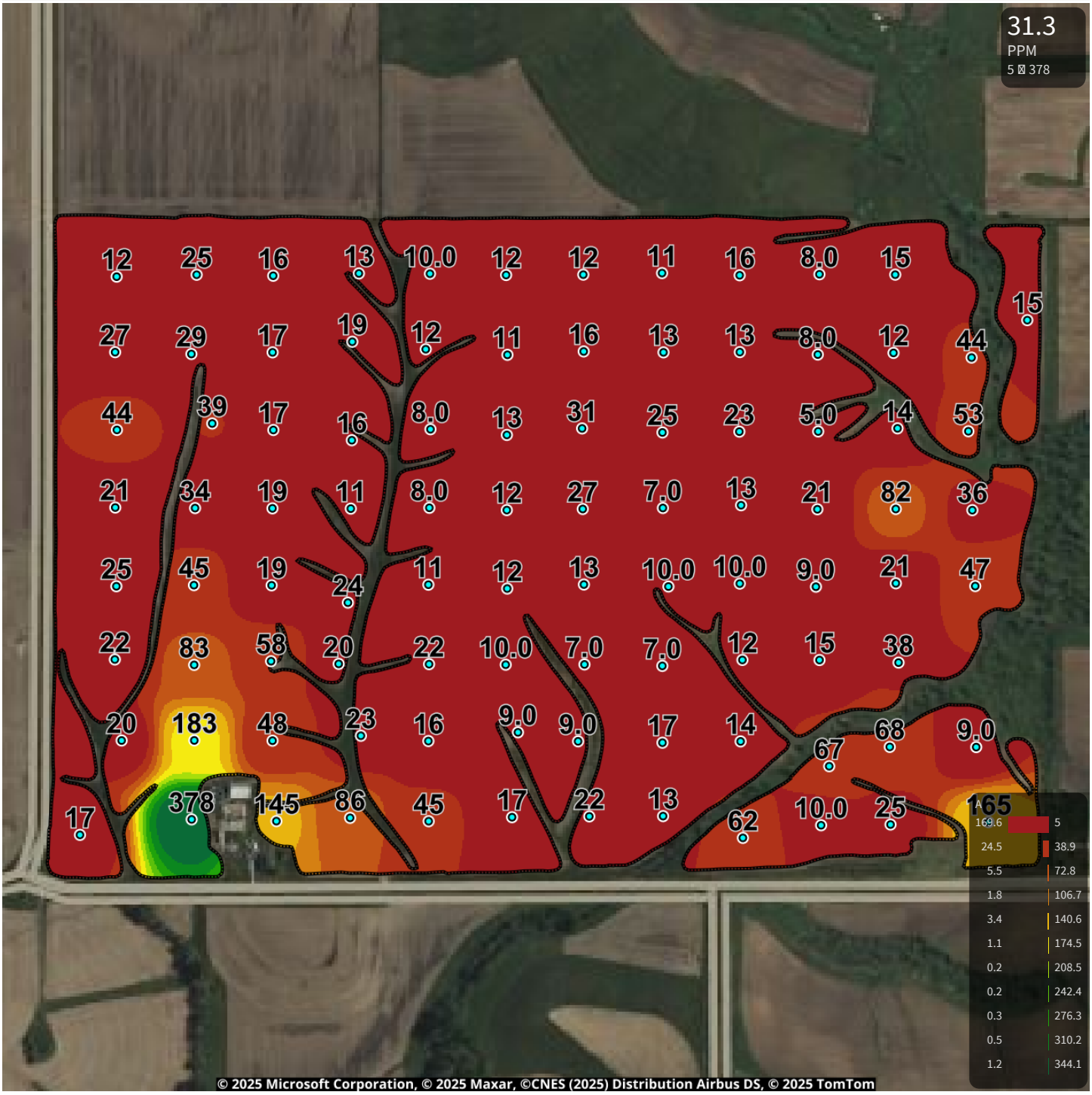
Lab Results Map

Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

P-Ols **Phosphorus - Olsen** (ppm)

0 - 6 in



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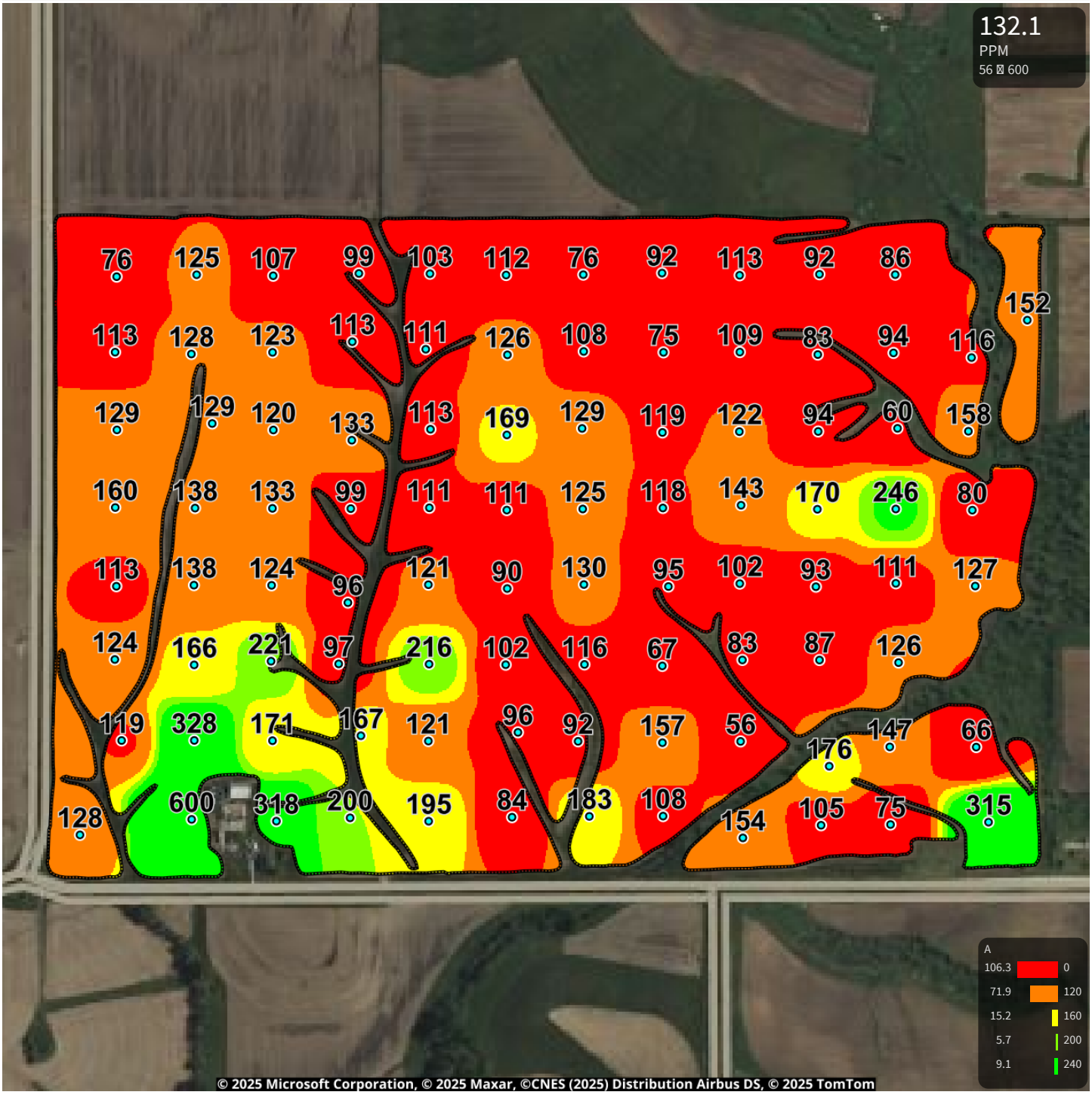
Lab Results Map

Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

K **Potassium** (ppm) 0 - 6 in



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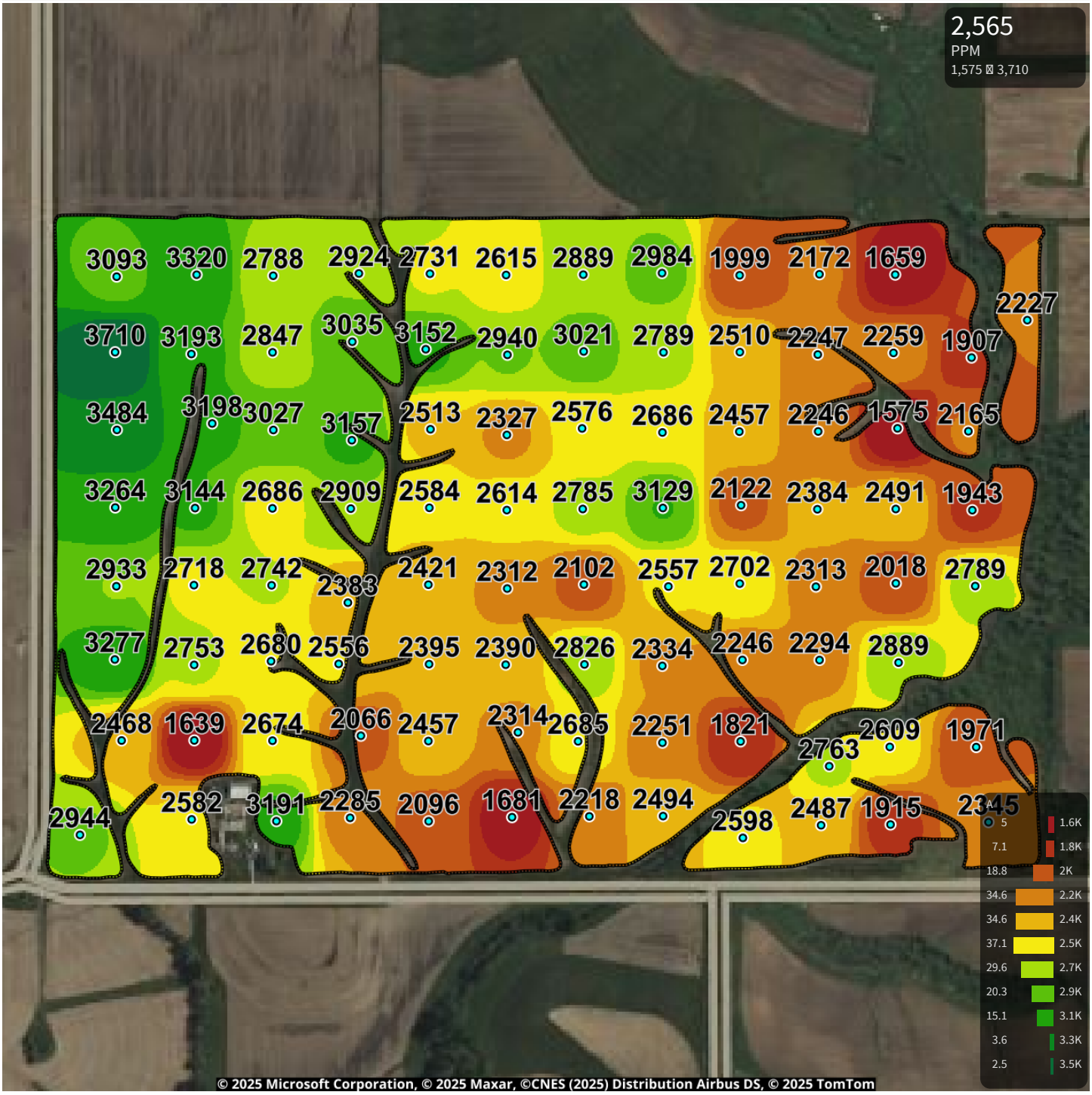
Lab Results Map

Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

Ca **Calcium** (ppm)

0 - 6 in



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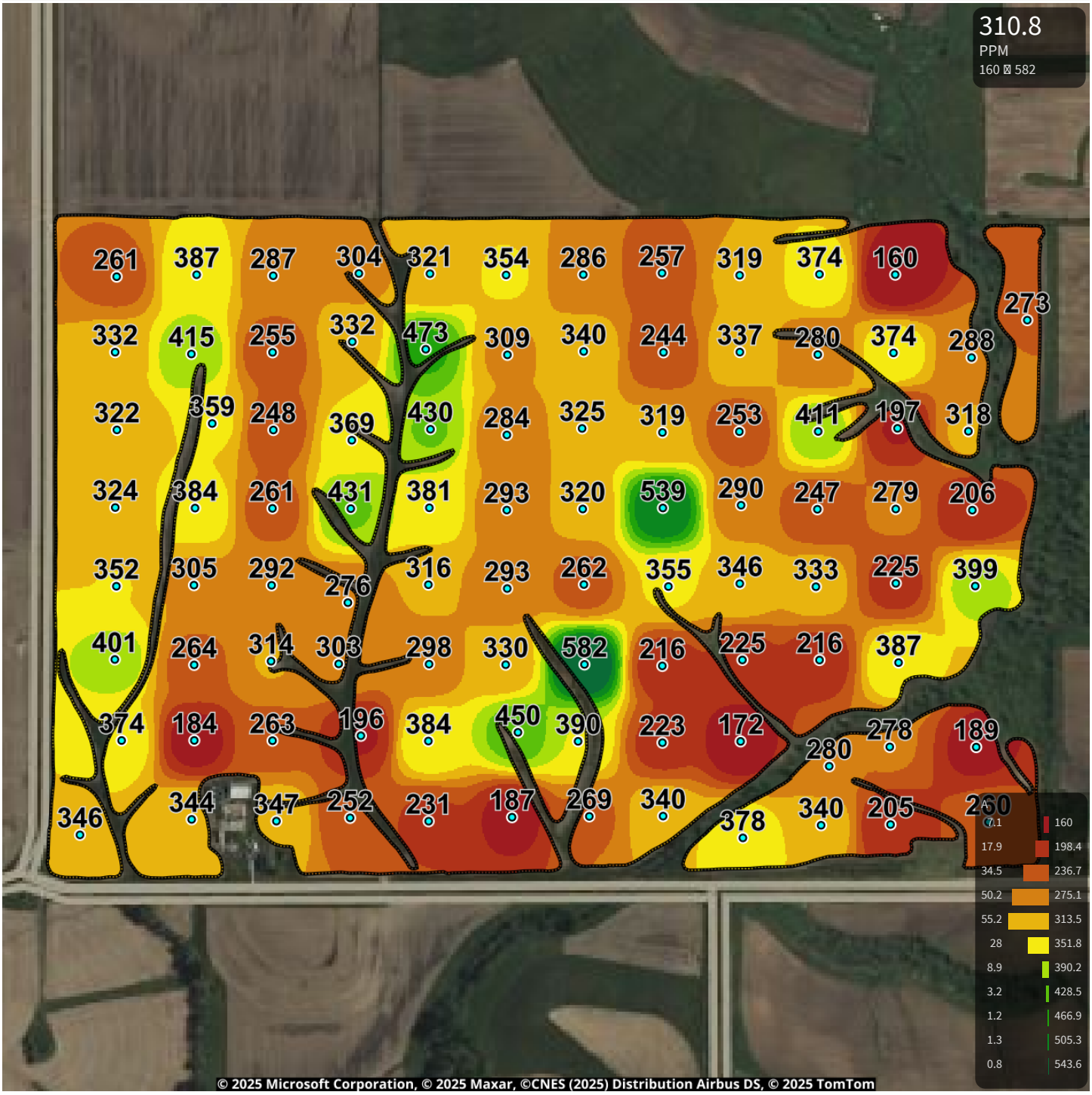
Lab Results Map

Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

Mg **Magnesium** (ppm)

0 - 6 in



Nutrien Eldon IA 1341
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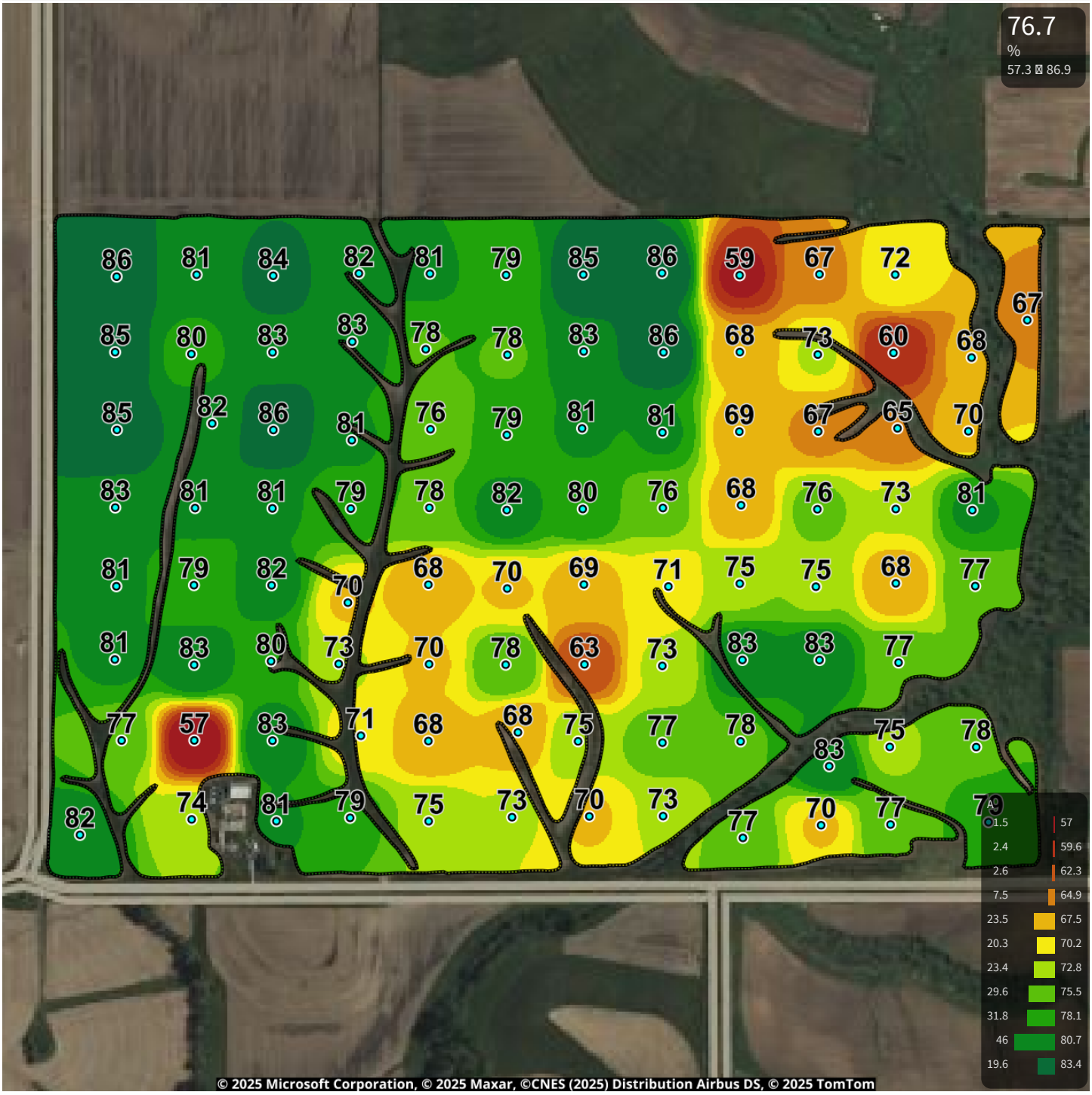
Lab Results Map

Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

BS-Ca **Base Saturation - Ca** (%)

0 - 6 in



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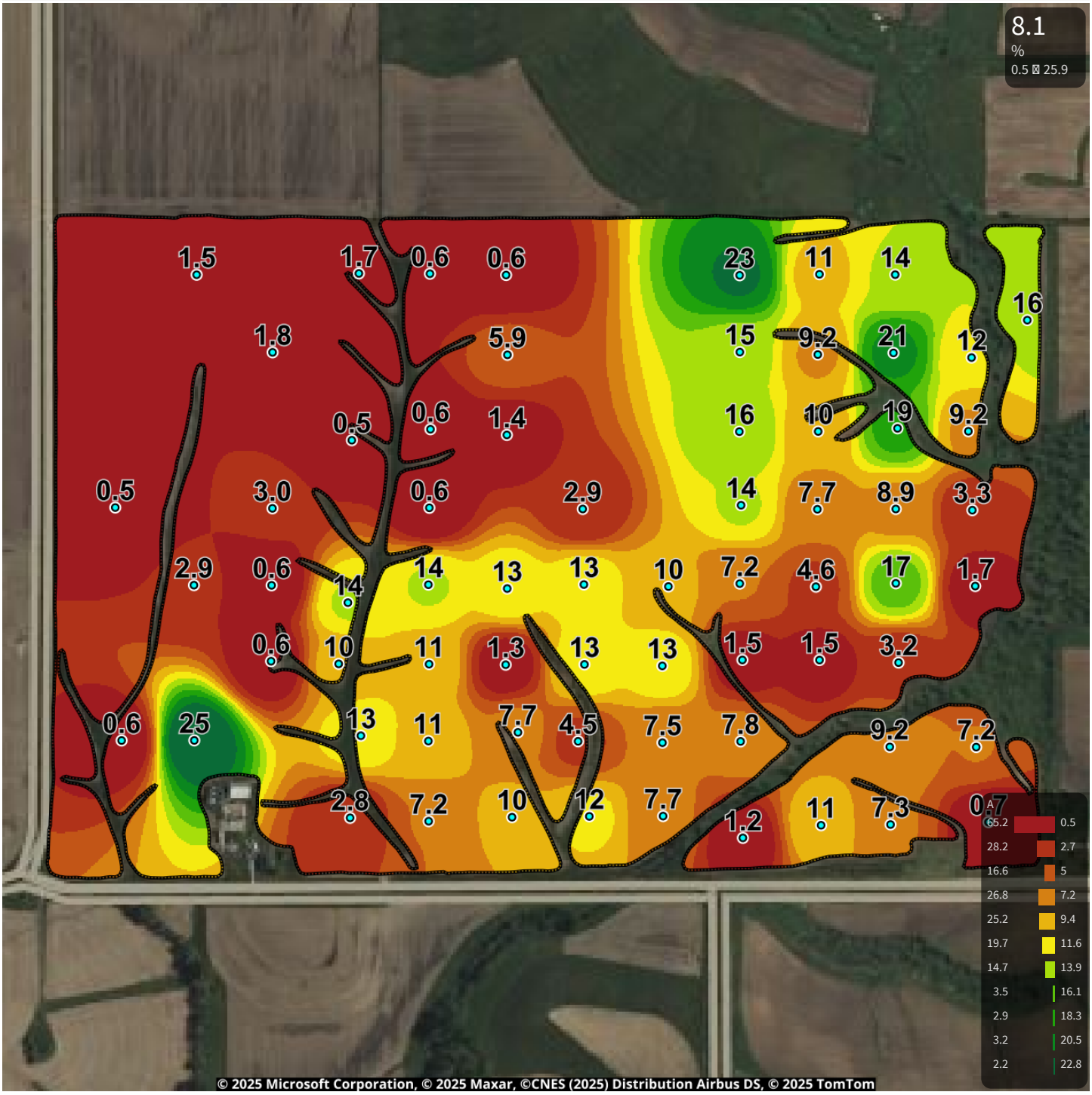
Lab Results Map

Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

BS-H **Base Saturation - H** (%)

0 - 6 in



Nutrien Ag Solutions | Echelon

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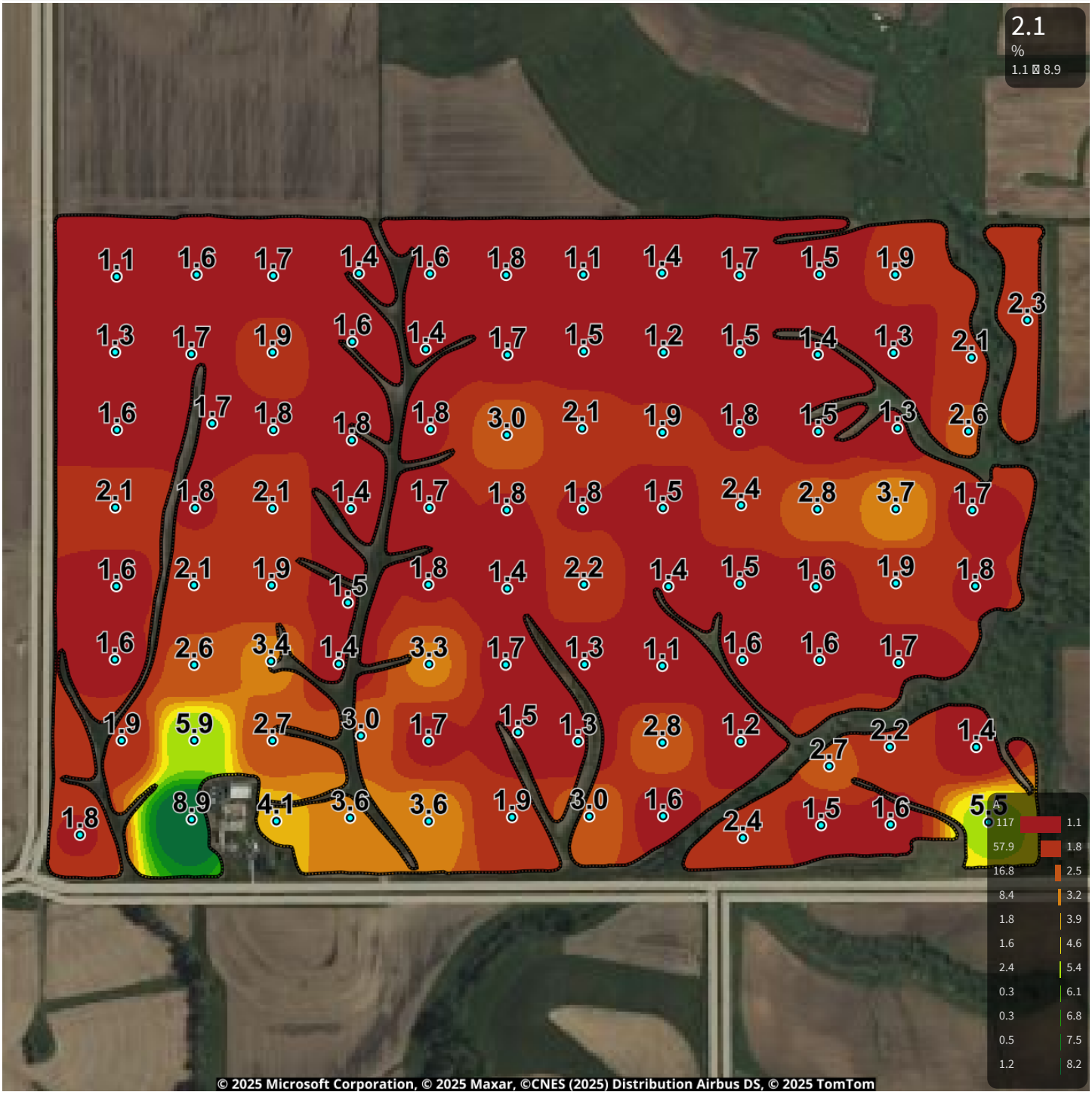
Lab Results Map

Soil Sample
2020-12-01

Grower **IOWA FAMILY FARMS**
Field **W of Verls**
Farm **McBeth**
Lab **Waypoint Analytical Iowa**
Area **208 a**

BS-K **Base Saturation - K** (%)

0 - 6 in



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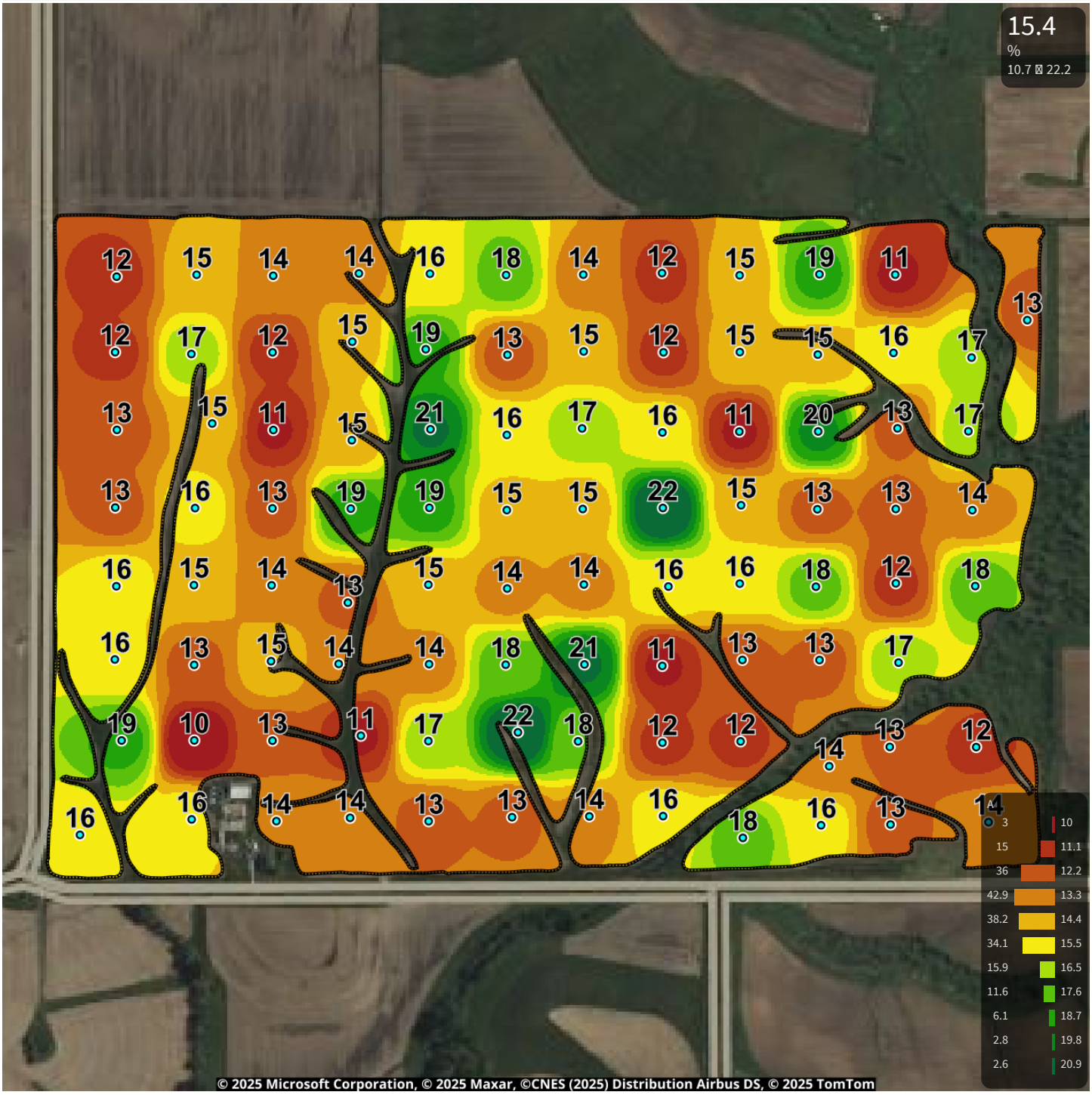
Lab Results Map

Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

BS-Mg **Base Saturation - Mg** (%)

0 - 6 in



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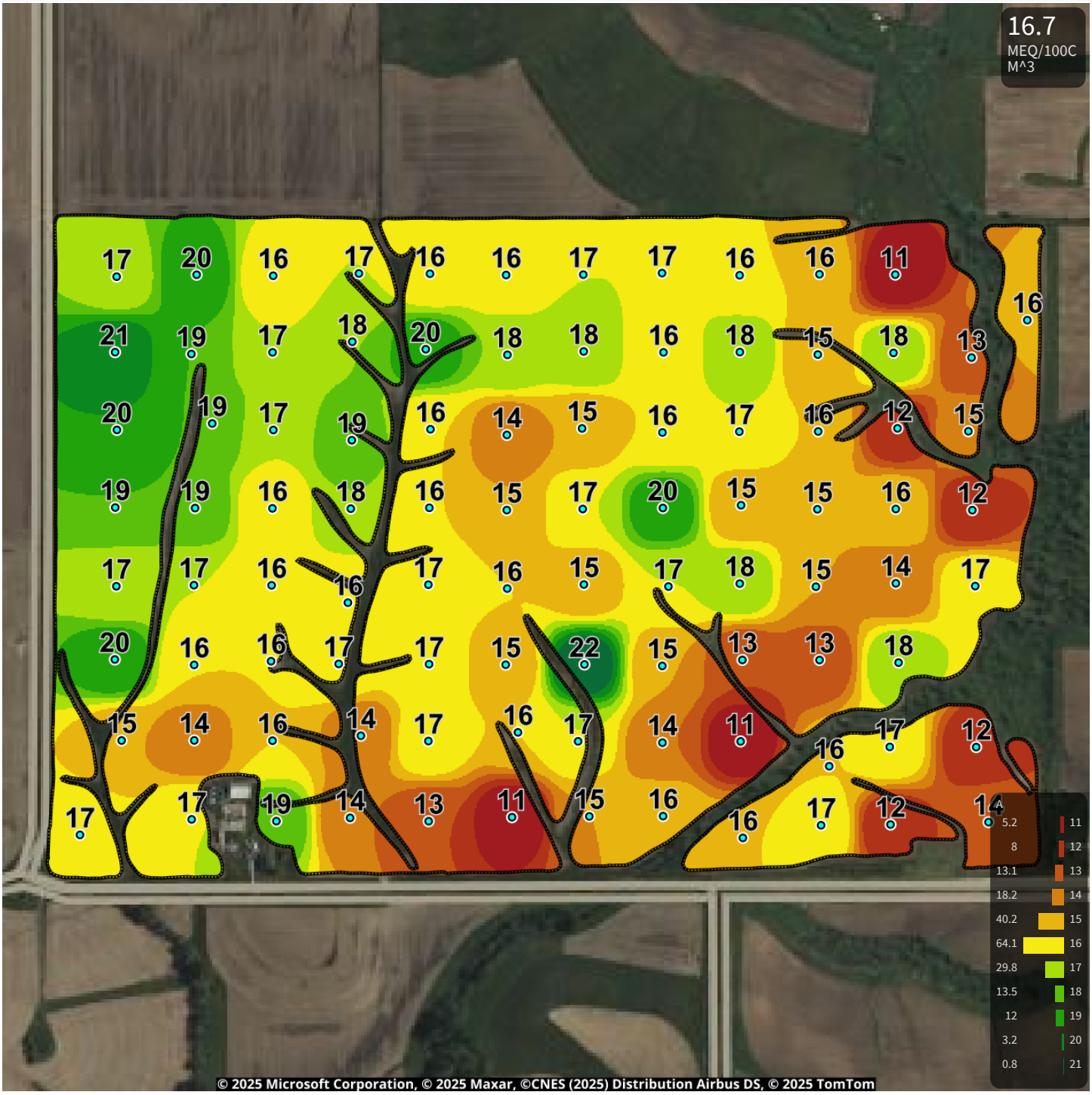
Lab Results Map

Soil Sample
2020-12-01

Grower	**IOWA FAMILY FARMS**	Farm	**McBeth**	Lab	**Waypoint Analytical Iowa**
Field	**W of Verls**			Area	**208 a**

CEC **Cation Exchange Capacity** (meq/100cm^3)

0 - 6 in



USGS 410647092145801 073N12W21BDCA 20823 1967

Available data for this site SUMMARY OF ALL AVAILABLE DATA Groundwater: Field measurements Revisions

Well Site

DESCRIPTION:

Latitude 41°06'47", Longitude 92°14'58" NAD27
Wapello County, Iowa , Hydrologic Unit 07080107
Well depth: 228 feet
Hole depth: 228 feet
Land surface altitude: 792.00 feet above NGVD29.

AVAILABLE DATA:

Data Type	Begin Date	End Date	Count
Field groundwater-level measurements	1967-05-10	1967-05-10	1
Revisions	Unavailable (site:0) (timeseries:0)		

OPERATION:

Record for this site is maintained by the USGS Iowa Water Science Center
Email questions about this site to Iowa Water Science Center Water-Data Inquiries

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wapello County, Iowa

September 26, 2025

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

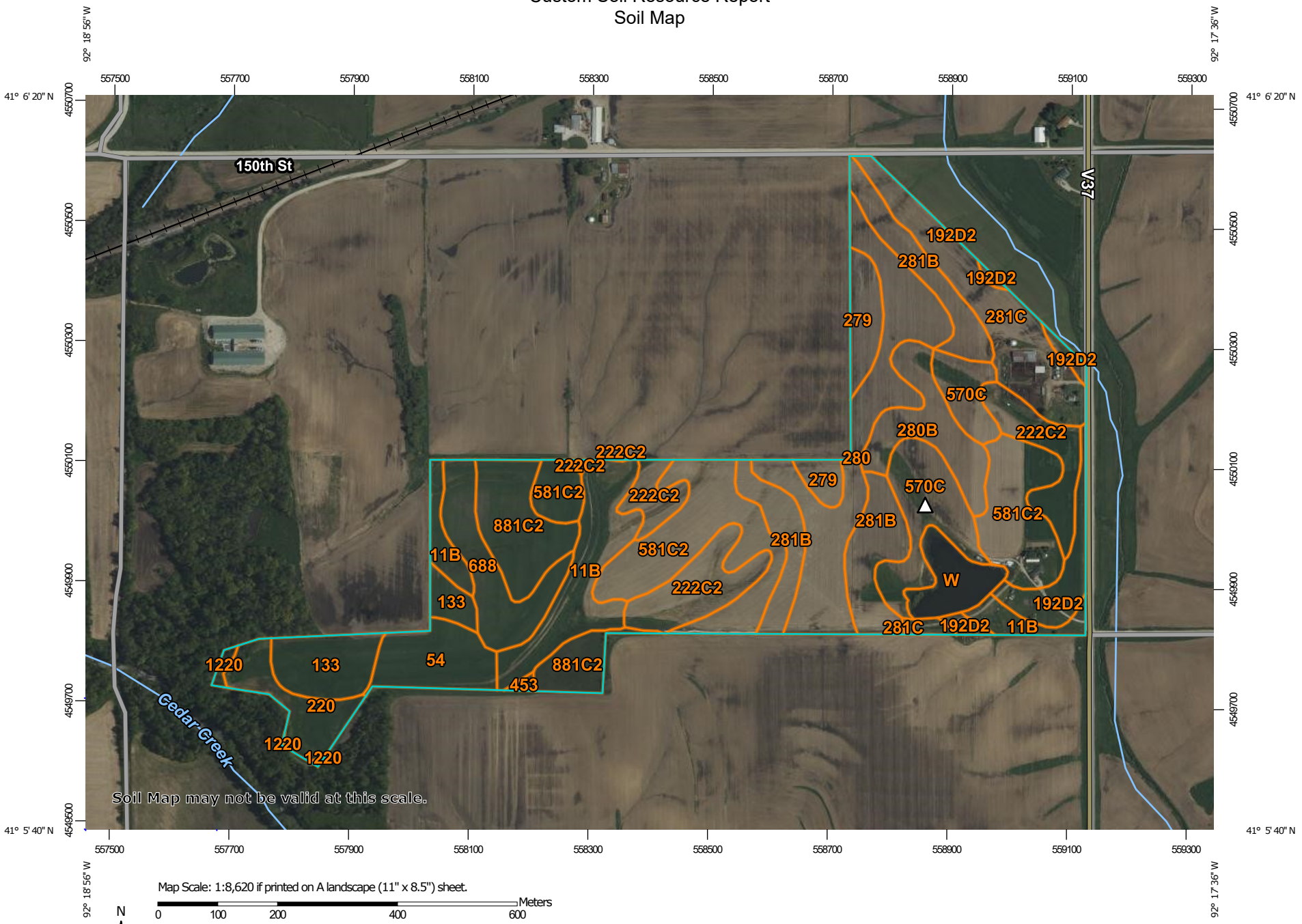
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wapello County, Iowa
Survey Area Data: Version 33, Aug 29, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 21, 2021—Nov 24, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
11B	Colo-Ely complex, 0 to 5 percent slopes	11.0	8.4%
54	Zook silty clay loam, 0 to 2 percent slopes	4.8	3.7%
133	Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded	5.5	4.2%
192D2	Adair clay loam, 9 to 14 percent slopes, moderately eroded	4.4	3.4%
220	Nodaway silt loam, 0 to 2 percent slopes	4.0	3.1%
222C2	Clarinda silty clay loam, 5 to 9 percent slopes, moderately eroded	11.0	8.4%
279	Taintor silty clay loam, 0 to 2 percent slopes	3.7	2.9%
280	Mahaska silty clay loam, 0 to 2 percent slopes	13.1	10.1%
280B	Mahaska silty clay loam, 2 to 5 percent slopes	5.6	4.3%
281B	Otley silty clay loam, 2 to 5 percent slopes	11.9	9.1%
281C	Otley silty clay loam, 5 to 9 percent slopes	9.6	7.4%
453	Tuskeego silt loam, 0 to 2 percent slopes	0.2	0.2%
570C	Nira silty clay loam, 5 to 9 percent slopes	8.8	6.7%
581C2	Otley-Nira silty clay loams, 5 to 9 percent slopes, moderately eroded	18.6	14.2%
688	Koszta silt loam, 0 to 2 percent slopes, rarely flooded	5.9	4.5%
881C2	Otley silty clay loam, terrace, 5 to 9 percent slopes, eroded	8.5	6.5%
1220	Nodaway silt loam, channeled, 0 to 2 percent slopes	0.4	0.3%
W	Water	3.4	2.6%
Totals for Area of Interest		**130.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Wapello County, Iowa

11B—Colo-Ely complex, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3dx
Elevation: 560 to 1,190 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 46 to 51 degrees F
Frost-free period: 149 to 179 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Colo and similar soils: 50 percent
Ely and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colo

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silty clay loam
A1 - 8 to 14 inches: silty clay loam
A2 - 14 to 34 inches: silty clay loam
BA - 34 to 40 inches: silty clay loam
Bg - 40 to 46 inches: silty clay loam
BCg - 46 to 52 inches: silty clay loam
Cg - 52 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R108XC519IA - Wet Upland Drainageway Prairie

Hydric soil rating: Yes

Description of Ely

Setting

Landform: Alluvial fans, drainageways
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Convex, linear
Parent material: Silty colluvium

Typical profile

Ap - 0 to 8 inches: silty clay loam
A - 8 to 24 inches: silty clay loam
BA - 24 to 32 inches: silty clay loam
Bg - 32 to 47 inches: silty clay loam
BCg - 47 to 58 inches: silty clay loam
Cg - 58 to 79 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 12 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: R108XC519IA - Wet Upland Drainageway Prairie
Hydric soil rating: No

Minor Components

Judson

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R108XC519IA - Wet Upland Drainageway Prairie
Hydric soil rating: No

Colo, frequently flooded

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope

Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R108XC519IA - Wet Upland Drainageway Prairie
Hydric soil rating: Yes

54—Zook silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: ftjj
Elevation: 500 to 1,400 feet
Mean annual precipitation: 34 to 37 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Zook, occasionally flooded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zook, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium

Typical profile

Ap - 0 to 7 inches: silty clay loam
A1,A2 - 7 to 20 inches: silty clay loam
A3,A4 - 20 to 38 inches: silty clay
Bg,BCg - 38 to 61 inches: silty clay loam
Cg - 61 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R109XY031MO - Wet Floodplain Prairie
Hydric soil rating: Yes

Minor Components

Colo, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC527IA - Wet Floodplain Sedge Meadow
Hydric soil rating: Yes

133—Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2t3dt
Elevation: 520 to 1,240 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 150 to 179 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Colo, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colo, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silty clay loam
A1 - 8 to 14 inches: silty clay loam
A2, A3 - 14 to 34 inches: silty clay loam
BA - 34 to 40 inches: silty clay loam

Bg - 40 to 46 inches: silty clay loam
BCg - 46 to 52 inches: silty clay loam
Cg - 52 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R108XC527IA - Wet Floodplain Sedge Meadow
Hydric soil rating: Yes

Minor Components

Zook, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC527IA - Wet Floodplain Sedge Meadow
Hydric soil rating: Yes

Ely

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R108XC519IA - Wet Upland Drainageway Prairie
Hydric soil rating: No

192D2—Adair clay loam, 9 to 14 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: fth2
Elevation: 650 to 1,500 feet

Mean annual precipitation: 34 to 37 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Adair, moderately eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Adair, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Red paleosol and underlying subglacial till

Typical profile

H1 - 0 to 7 inches: clay loam
H2 - 7 to 43 inches: clay
H3 - 43 to 60 inches: clay loam

Properties and qualities

Slope: 9 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R108XC509IA - Till Backslope Prairie
Hydric soil rating: No

Minor Components

Clarinda, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC510IA - Till Backslope Seepage Meadow
Hydric soil rating: Yes

Shelby, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R108XC509IA - Till Backslope Prairie
Hydric soil rating: No

220—Nodaway silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: fth6
Elevation: 400 to 1,400 feet
Mean annual precipitation: 34 to 37 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Nodaway, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nodaway, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
C1 - 8 to 31 inches: stratified silt loam to silty clay loam
C2 - 31 to 42 inches: stratified silt loam to silty clay loam
C3 - 42 to 80 inches: stratified silt loam to silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Occasional

Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F109XY030MO - Loamy Floodplain Forest
Hydric soil rating: No

Minor Components

Colo, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC527IA - Wet Floodplain Sedge Meadow
Hydric soil rating: Yes

Landes, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F108XC530IA - Sandy Floodplain Forest
Hydric soil rating: No

222C2—Clarinda silty clay loam, 5 to 9 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2tfyz
Elevation: 650 to 1,500 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Clarinda, moderately eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clarinda, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Clayey loess over gray paleosol and underlying subglacial till

Typical profile

Ap - 0 to 8 inches: silty clay loam
2Bt - 8 to 16 inches: silty clay
2Btg - 16 to 67 inches: silty clay
2BC - 67 to 79 inches: silty clay

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: R109XY006MO - Till Upland Prairie
Hydric soil rating: Yes

Minor Components

Clearfield

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC510IA - Till Backslope Seepage Meadow
Hydric soil rating: Yes

Clarinda, severely eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave

Ecological site: R109XY006MO - Till Upland Prairie
Hydric soil rating: Yes

279—Taintor silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t3bp
Elevation: 640 to 990 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 175 to 205 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Taintor and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Taintor

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 9 inches: silty clay loam
A1 - 9 to 16 inches: silty clay loam
A2 - 16 to 20 inches: silty clay loam
Btg1 - 20 to 24 inches: silty clay
Btg2 - 24 to 28 inches: silty clay
Btg3 - 28 to 36 inches: silty clay loam
Btg4 - 36 to 46 inches: silty clay loam
Cg - 46 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: Yes

Minor Components

Mahaska

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: No

Sperry

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC515IA - Ponded Upland Depression Sedge Meadow
Hydric soil rating: Yes

280—Mahaska silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t3bs
Elevation: 530 to 990 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 175 to 205 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Mahaska and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mahaska

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
A1 - 7 to 13 inches: silty clay loam
A2 - 13 to 18 inches: silty clay loam
BA - 18 to 24 inches: silty clay loam
Bt - 24 to 30 inches: silty clay loam
Btg1 - 30 to 40 inches: silty clay loam
Btg2 - 40 to 61 inches: silty clay loam
BCg - 61 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 12 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C/D
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: No

Minor Components

Taintor

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: Yes

280B—Mahaska silty clay loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3bt

Elevation: 610 to 910 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 50 to 51 degrees F
Frost-free period: 180 to 205 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Mahaska and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mahaska

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
A1 - 7 to 13 inches: silty clay loam
A2 - 13 to 18 inches: silty clay loam
BA - 18 to 24 inches: silty clay loam
Bt - 24 to 30 inches: silty clay loam
Btg1 - 30 to 40 inches: silty clay loam
Btg2 - 40 to 61 inches: silty clay loam
BCg - 61 to 79 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 12 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: No

Minor Components

Taintor

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: Yes

Otley

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

281B—Otley silty clay loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2rlzx
Elevation: 620 to 980 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 170 to 205 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Otley and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otley

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
A - 7 to 17 inches: silty clay loam
Bt1 - 17 to 26 inches: silty clay loam
Bt2 - 26 to 32 inches: silty clay loam
Bt3 - 32 to 40 inches: silty clay loam
Btg1 - 40 to 46 inches: silty clay loam
Btg2 - 46 to 53 inches: silty clay loam
Btg3 - 53 to 61 inches: silty clay loam

Cg1 - 61 to 73 inches: silty clay loam
Cg2 - 73 to 79 inches: silt loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 8 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Mahaska

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC516IA - Wet Loess Upland Flat Prairie
Hydric soil rating: No

281C—Otley silty clay loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2t3bx
Elevation: 670 to 970 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 175 to 205 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Otley and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otley

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
A - 7 to 17 inches: silty clay loam
Bt1 - 17 to 26 inches: silty clay loam
Bt2 - 26 to 32 inches: silty clay loam
Bt3 - 32 to 40 inches: silty clay loam
Btg1 - 40 to 46 inches: silty clay loam
Btg2 - 46 to 53 inches: silty clay loam
Btg3 - 53 to 61 inches: silty clay loam
Cg1 - 61 to 73 inches: silty clay loam
Cg2 - 73 to 79 inches: silt loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 8 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Otley, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Clearfield

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC510IA - Till Backslope Seepage Meadow
Hydric soil rating: Yes

453—Tuskeego silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: ftj9
Elevation: 500 to 1,300 feet
Mean annual precipitation: 34 to 37 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Tuskeego, rarely flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tuskeego, Rarely Flooded

Setting

Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
E - 8 to 19 inches: silt loam
Bg - 19 to 24 inches: silty clay loam
Btg - 24 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Rare

Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: R109XY038MO - Wet Terrace Prairie
Hydric soil rating: Yes

Minor Components

Coppock, occasionally flooded

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC523IA - Wet Terrace Sedge Meadow
Hydric soil rating: Yes

Humeston, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R108XC527IA - Wet Floodplain Sedge Meadow
Hydric soil rating: Yes

Koszta, rarely flooded

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC522IA - Terrace Savanna
Hydric soil rating: No

570C—Nira silty clay loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: ftjl
Elevation: 650 to 1,350 feet
Mean annual precipitation: 33 to 38 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Nira and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nira

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

H1 - 0 to 12 inches: silty clay loam
H2 - 12 to 42 inches: silty clay loam
H3 - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Otley

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

581C2—Otley-Nira silty clay loams, 5 to 9 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: ftjm
Elevation: 650 to 1,500 feet
Mean annual precipitation: 33 to 38 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Otley, moderately eroded, and similar soils: 60 percent
Nira, moderately eroded, and similar soils: 35 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otley, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

Ap - 0 to 8 inches: silty clay loam
Bt, Btg - 8 to 56 inches: silty clay loam
BCg, Cg - 56 to 80 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Description of Nira, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

H1 - 0 to 12 inches: silty clay loam
H2 - 12 to 42 inches: silty clay loam
H3 - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Clarinda, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R108XC510IA - Till Backslope Seepage Meadow
Hydric soil rating: Yes

688—Koszta silt loam, 0 to 2 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2wbdj
Elevation: 600 to 1,300 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Koszta, rarely flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Koszta, Rarely Flooded

Setting

Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
E - 8 to 13 inches: silt loam
BE - 13 to 21 inches: silty clay loam
Btg - 21 to 48 inches: silty clay loam
BCg - 48 to 57 inches: silty clay loam
Cg - 57 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1

Hydrologic Soil Group: B/D
Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

Minor Components

Coppock, occasionally flooded
Percent of map unit: 5 percent
Landform: Flood-plain steps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R109XY038MO - Wet Terrace Prairie
Hydric soil rating: Yes

Tuskeego, rarely flooded
Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R109XY038MO - Wet Terrace Prairie
Hydric soil rating: Yes

881C2—Otley silty clay loam, terrace, 5 to 9 percent slopes, eroded

Map Unit Setting
National map unit symbol: 2t3c2
Elevation: 660 to 900 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Otley, moderately eroded, terrace, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otley, Moderately Eroded, Terrace

Setting
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 8 inches: silty clay loam
Bt1 - 8 to 17 inches: silty clay loam
Bt2 - 17 to 23 inches: silty clay loam
Bt3 - 23 to 31 inches: silty clay loam
Btg1 - 31 to 37 inches: silty clay loam
Btg2 - 37 to 44 inches: silty clay loam
Btg3 - 44 to 52 inches: silty clay loam
Cg1 - 52 to 64 inches: silty clay loam
Cg2 - 64 to 79 inches: silt loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 8 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Otley, severely eroded, terrace

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC503IA - Loess Upland Prairie
Hydric soil rating: No

1220—Nodaway silt loam, channeled, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: ftgg
Elevation: 400 to 1,400 feet
Mean annual precipitation: 34 to 37 inches

Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Nodaway, frequently flooded, channeled, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nodaway, Frequently Flooded, Channeled

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
C1 - 8 to 31 inches: stratified silt loam to silty clay loam
C2 - 31 to 42 inches: stratified silt loam to silty clay loam
C3 - 42 to 80 inches: stratified silt loam to silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Ecological site: F109XY030MO - Loamy Floodplain Forest
Hydric soil rating: Yes

Minor Components

Colo, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XC527IA - Wet Floodplain Sedge Meadow
Hydric soil rating: Yes

Landes, frequently flooded
Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F108XD901IA - Loamy Floodplain Forest
Hydric soil rating: Yes

Zook, frequently flooded
Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F108XC520IA - Upland Drainageway Woodland
Hydric soil rating: Yes

W—Water

Map Unit Setting
National map unit symbol: 2xm9n
Elevation: 520 to 1,310 feet
Mean annual precipitation: 23 to 41 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 155 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Setting
Landform: Oxbow lakes

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SOIL ANALYSIS

Client :	Grower :	
Nutrien Ag Solutions, Inc. (Eldon) Brian Fullenkamp 311 E Main P.O. Box 99 Eldon IA 52554	Matt Black	Report No: 24-264-0539 Cust No: 03000 Date Printed: 09/21/2024 Date Received : 09/20/2024 PO: Page : 3 of 7

Lab No: 02318 **Field:** **Sample ID:** Cramblit 90 1

Test		Results	SOIL TEST RATINGS (Very Low / Low / Medium / Optimum / Very High)
Soil pH	1:1	6.1	
Buffer pH	BPH	6.73	
Phosphorus (P)	P1	26 ppm	
Potassium (K)	AA	63 ppm	
Calcium (Ca)	AA	1922 ppm	
Magnesium (Mg)	AA	316 ppm	
Sulfur (S)	SO4	7 ppm	
Boron (B)	M3	0.3 ppm	
Copper (Cu)	DTPA	1.5 ppm	
Iron (Fe)	DTPA	57 ppm	
Manganese (Mn)	DTPA	12 ppm	
Zinc (Zn)	DTPA	0.9 ppm	
Sodium (Na)	AA	14 ppm	
Soluble Salts			
Organic Matter	LOI	4.2%	
Estimated N Release		128 lbs/acre	
Nitrate Nitrogen			

Calculated Cation Exchange Capacity: **14.5** meq/100g

%Saturation

	%sat	meq
K	1.1	0.2
Ca	66.3	9.6
Mg	18.2	2.6
H	13.8	2.0
Na	0.4	0.1

K/Mg Ratio: 0.06

Ca/Mg Ratio: 3.64

SOIL FERTILITY GUIDELINES

Crop : Soybeans **Yield Goal :** 50 BU **Rec Units:** LB/ACRE

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe
2589 1.3	0	32	124	0	9	1.3	0.4	4	2.5	0

Crop : Corn **Yield Goal :** 150 BU **Rec Units:** LB/ACRE

2589	1.3	180	35	136	0	9	1.4	0.4	2	2.5	0

Comments :

Soybeans

Limestone application is targeted to bring soil pH to 6.5.

- For soybeans on soils with a pH of 6.2 or less apply limestone as recommended or plant seed treated with molybdenum. Apply 1-2 oz of sodium molybdate (0.4-0.8 oz of elemental molybdenum) per acre as a seed treatment.
- Soybeans should be inoculated when planted in fields with no soybean production in the past 3 years.

Corn

Limestone application is targeted to bring soil pH to 6.5.

- Greater N efficiency for corn may be achieved by splitting the N application. Apply 1/4 to 1/3 of the N prior to or at planting and the remainder as sidedress when corn is 8-24 inches high.
- For early planted corn apply a starter fertilizer at least 2 inches from the seed at a rate of 10-20 lbs N/Acre and 30-60 lbs P2O5/Acre.

M3 - Mehlich 3 BPH - Lime Index AA - Ammonium Acetate(c) DTPA - DTPA Micros(c) LOI - Loss On Ignition P1 - Weak Bray P(s) 1:1 - Water pH SO4 -

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SOIL ANALYSIS

Client :
Nutrien Ag Solutions, Inc. (Eldon)
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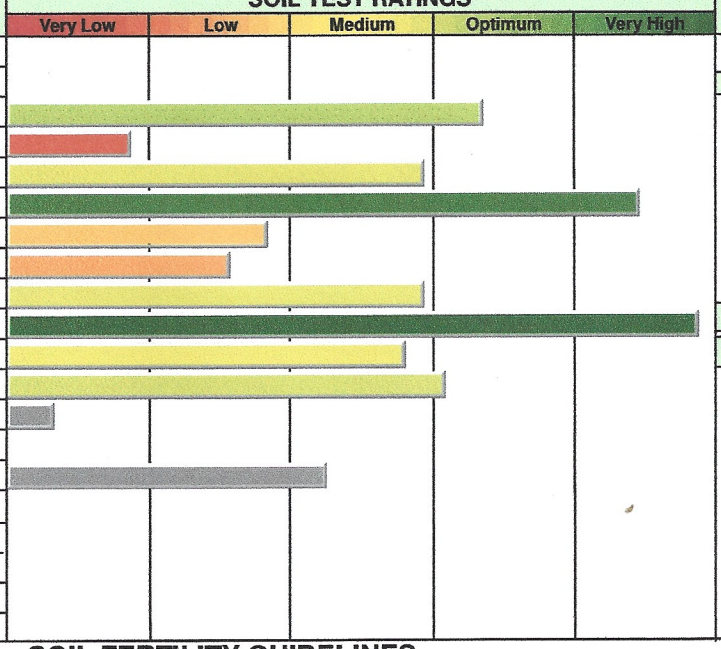
Grower :
Matt Black

Report No: 24-264-0539
Cust No: 03000
Date Printed: 09/21/2024
Date Received : 09/20/2024
PO:
Page : 4 of 7

Lab No: 02319 **Field:** **Sample ID:** Cramblit 90 2

Test		Results
Soil pH	1:1	6.3
Buffer pH	BPH	6.78
Phosphorus (P)	P1	25 ppm
Potassium (K)	AA	50 ppm
Calcium (Ca)	AA	2001 ppm
Magnesium (Mg)	AA	339 ppm
Sulfur (S)	SO4	7 ppm
Boron (B)	M3	0.3 ppm
Copper (Cu)	DTPA	1.5 ppm
Iron (Fe)	DTPA	51 ppm
Manganese (Mn)	DTPA	12 ppm
Zinc (Zn)	DTPA	0.9 ppm
Sodium (Na)	AA	14 ppm
Soluble Salts		
Organic Matter	LOI	3.3%
Estimated N Release		110 lbs/acre
Nitrate Nitrogen		

SOIL TEST RATINGS



Calculated Cation Exchange Capacity
14.5 meq/100g

%Saturation

	%sat	meq
K	0.9	0.1
Ca	69.0	10.0
Mg	19.5	2.8
H	10.3	1.5
Na	0.4	0.1

K/Mg Ratio: 0.05
Ca/Mg Ratio: 3.54

SOIL FERTILITY GUIDELINES

Crop : Soybeans **Yield Goal :** 50 BU **Rec Units:** LB/ACRE

(lbs) LIME (tons)	N	P_2O_5	K_2O	Mg	S	B	Cu	Mn	Zn	Fe
0 0	0	36	130	0	9	1.3	0.4	4	2.5	0

Crop : Corn **Yield Goal :** 150 BU **Rec Units:** LB/ACRE

0	0	180	41	145	0	9	1.4	0.4	2	2.5	0

Comments :

Soybeans

- For soybeans on soils with a pH of 6.2 or less apply limestone as recommended or plant seed treated with molybdenum. Apply 1-2 oz of sodium molybdate (0.4-0.8 oz of elemental molybdenum) per acre as a seed treatment.
- Soybeans should be inoculated when planted in fields with no soybean production in the past 3 years.

Corn

- Greater N efficiency for corn may be achieved by splitting the N application. Apply 1/4 to 1/3 of the N prior to or at planting and the remainder as sidedress when corn is 8-24 inches high.
- For early planted corn apply a starter fertilizer at least 2 inches from the seed at a rate of 10-20 lbs N/Acre and 30-60 lbs P2O5/Acre.

M3 - Mehlich 3 BPH - Lime Index AA - Ammonium Acetate(c) DTPA - DTPA Micros(c) LOI - Loss On Ignition P1 - Weak Bray P(s) 1:1 - Water pH SO4 -

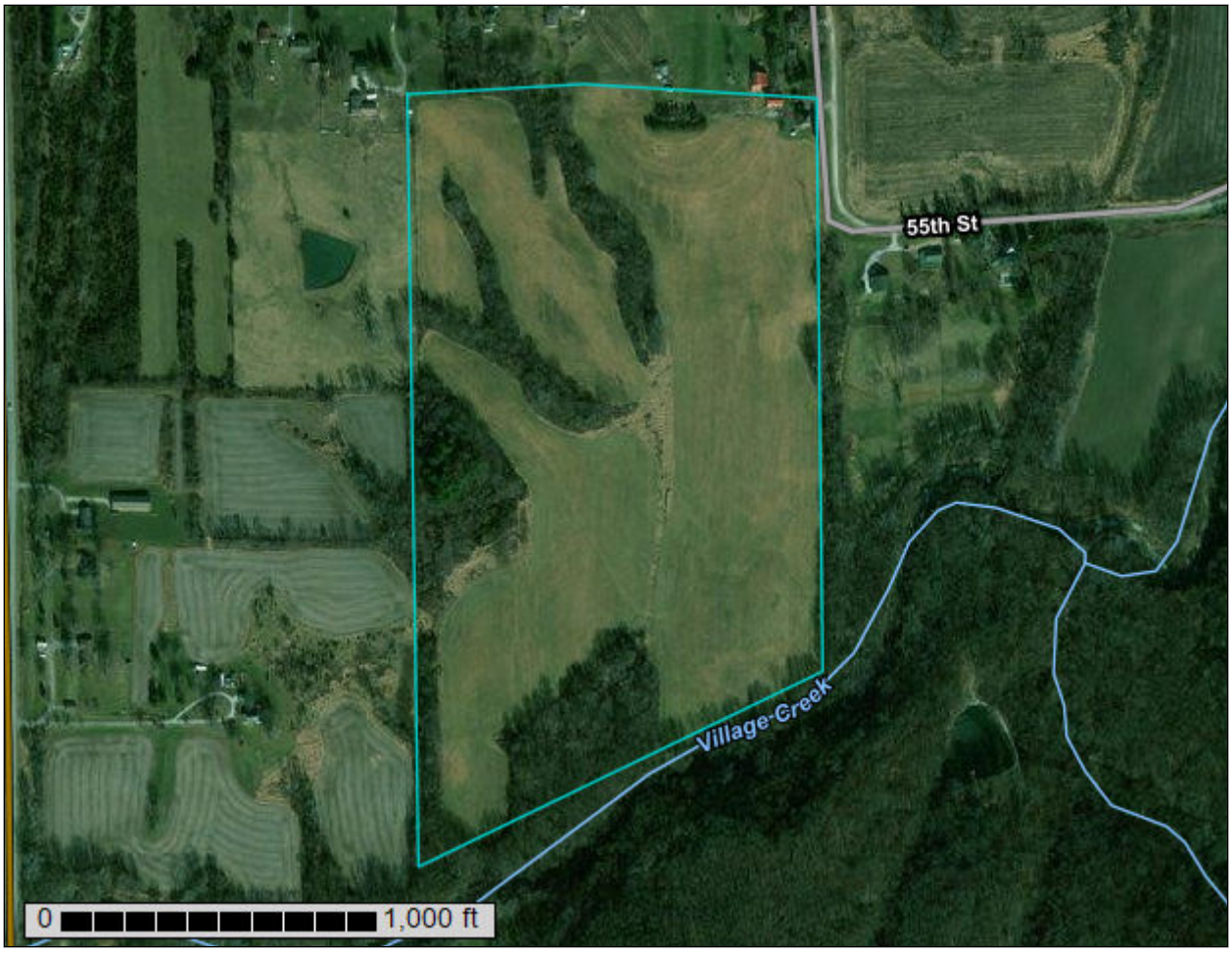
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wapello County, Iowa



November 24, 2025

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

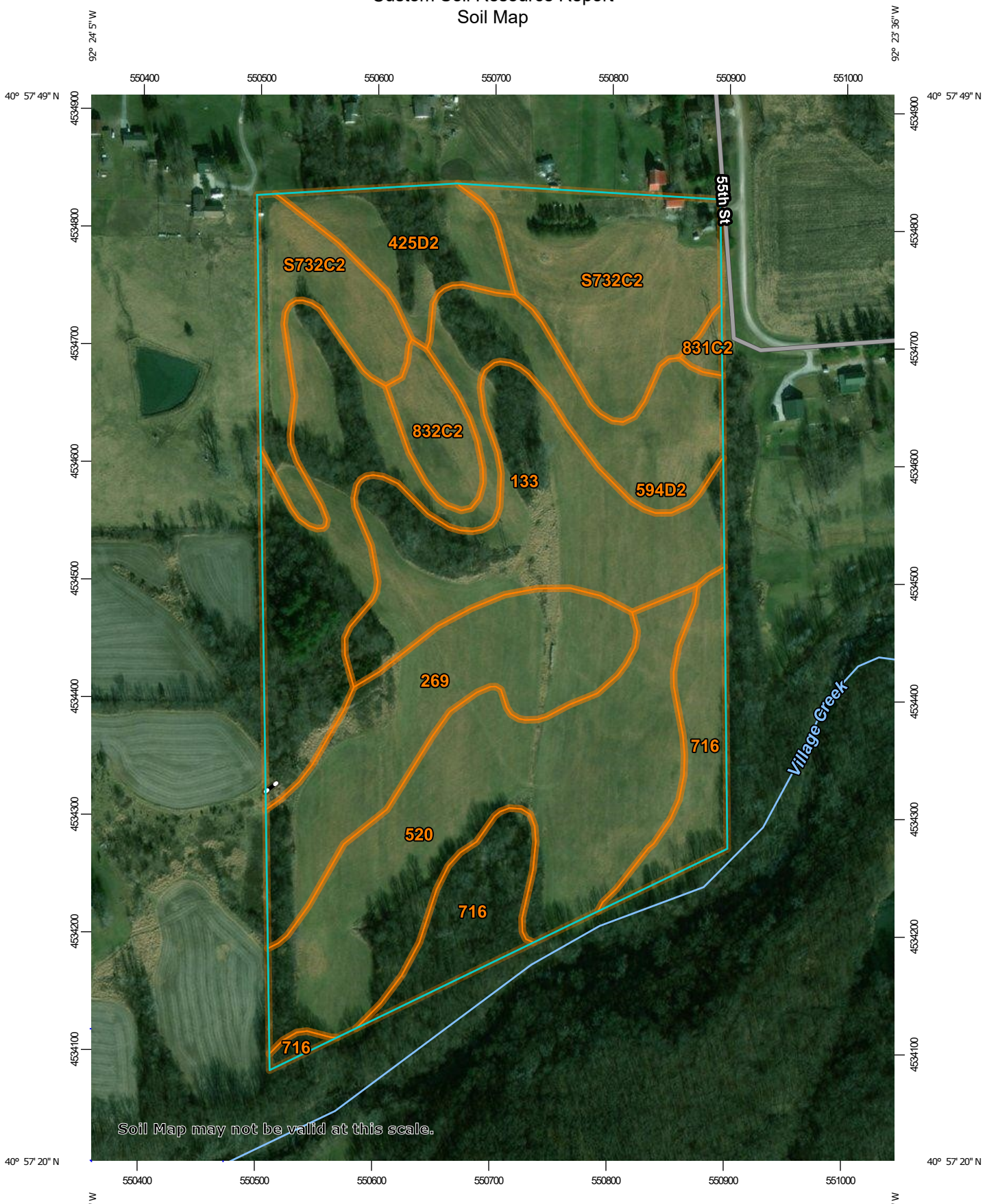
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:4,420 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wapello County, Iowa
Survey Area Data: Version 34, Sep 9, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 28, 2009—Feb 4, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
133	Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded	9.0	14.1%
269	Humeston silt loam, 0 to 2 percent slopes, occasionally flooded	7.7	12.1%
425D2	Keswick loam, 9 to 14 percent slopes, moderately eroded	3.3	5.2%
520	Coppock silt loam, 0 to 2 percent slopes, occasionally flooded	13.2	20.6%
594D2	Galland loam, heavy loess, 9 to 14 percent slopes, moderately eroded	12.7	19.9%
716	Lawson-Quiver-Nodaway complex, 0 to 2 percent slopes, occasionally flooded	5.6	8.8%
831C2	Pershing silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded	0.3	0.5%
832C2	Weller silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded	1.7	2.6%
S732C2	Weller silty clay loam, 5 to 9 percent slopes, moderately eroded	10.4	16.3%
Totals for Area of Interest		**63.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion

of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Wapello County, Iowa

133—Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2t3dt
Elevation: 520 to 1,240 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 150 to 179 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Colo, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colo, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silty clay loam
A1 - 8 to 14 inches: silty clay loam
A2, A3 - 14 to 34 inches: silty clay loam
BA - 34 to 40 inches: silty clay loam
Bg - 40 to 46 inches: silty clay loam
BCg - 46 to 52 inches: silty clay loam
Cg - 52 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R104XY018IA - Wet Floodplain Sedge Meadow

Forage suitability group: Level Swale, Neutral (G104XS001MN)
Other vegetative classification: Level Swale, Neutral (G104XS001MN)
Hydric soil rating: Yes

Minor Components

Zook, occasionally flooded
Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R104XY018IA - Wet Floodplain Sedge Meadow
Other vegetative classification: Level Swale, Neutral (G104XS001MN)
Hydric soil rating: Yes

Ely
Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R104XY015IA - Terrace Savanna
Other vegetative classification: Sloping Upland, Neutral (G104XS002MN)
Hydric soil rating: No

269—Humeston silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting
National map unit symbol: 2wjfg
Elevation: 660 to 980 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Humeston, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Humeston, Occasionally Flooded

Setting
Landform: Flood-plain steps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
A - 8 to 13 inches: silt loam
E - 13 to 22 inches: silt loam
BE - 22 to 26 inches: silty clay loam
Btg - 26 to 50 inches: silty clay loam
BCg - 50 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: R109XY038MO - Wet Terrace Prairie
Hydric soil rating: Yes

Minor Components

Vesser, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood-plain steps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R109XY031MO - Wet Floodplain Prairie
Hydric soil rating: Yes

Zook, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood-plain steps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R109XY031MO - Wet Floodplain Prairie
Hydric soil rating: Yes

425D2—Keswick loam, 9 to 14 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2tk9t
Elevation: 700 to 1,300 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 177 to 209 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Keswick, moderately eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Keswick, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Red paleosol till over subglacial till

Typical profile

Ap - 0 to 10 inches: loam
2Bt - 10 to 34 inches: clay
2BC - 34 to 79 inches: clay loam

Properties and qualities

Slope: 9 to 14 percent
Depth to restrictive feature: 5 to 10 inches to abrupt textural change
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: F109XY007MO - Till Upland Woodland
Hydric soil rating: No

Minor Components

Lindley, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F109XY022MO - Till Exposed Backslope Woodland, F109XY009MO - Till Protected Backslope Forest
Hydric soil rating: No

Keswick, severely eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F109XY007MO - Till Upland Woodland
Hydric soil rating: No

520—Coppock silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2wbdf
Elevation: 500 to 1,200 feet
Mean annual precipitation: 33 to 39 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Coppock, occasionally flooded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Coppock, Occasionally Flooded

Setting

Landform: Flood-plain steps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam

E - 8 to 25 inches: silt loam
Btg - 25 to 43 inches: silty clay loam
BCg - 43 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R109XY038MO - Wet Terrace Prairie
Hydric soil rating: Yes

Minor Components

Tuskeego, rarely flooded

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R109XY038MO - Wet Terrace Prairie
Hydric soil rating: Yes

594D2—Galland loam, heavy loess, 9 to 14 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2wjfl
Elevation: 550 to 1,300 feet
Mean annual precipitation: 34 to 38 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Galland, moderately eroded, and similar soils: 85 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Galland, Moderately Eroded

Setting

Landform: Stream terraces
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey and loamy valley side alluvium from till

Typical profile

Ap - 0 to 8 inches: loam
BE - 8 to 11 inches: loam
Bt - 11 to 38 inches: clay loam
BC - 38 to 48 inches: clay loam
C - 48 to 79 inches: stratified loam

Properties and qualities

Slope: 9 to 14 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C/D
Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

Minor Components

Douds, moderately eroded

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

Weller, terrace

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear

Ecological site: F115XB022MO - Loess High Terrace Forest
Hydric soil rating: No

Galland, severely eroded
Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

716—Lawson-Quiver-Nodaway complex, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting
National map unit symbol: 2rlzm
Elevation: 610 to 970 feet
Mean annual precipitation: 36 to 38 inches
Mean annual air temperature: 51 to 52 degrees F
Frost-free period: 155 to 175 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Lawson, occasionally flooded, and similar soils: 30 percent
Quiver, occasionally flooded, and similar soils: 25 percent
Nodaway, occasionally flooded, and similar soils: 20 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lawson, Occasionally Flooded

Setting
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile
Ap - 0 to 9 inches: silt loam
A - 9 to 30 inches: silt loam
Cg - 30 to 79 inches: silt loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 12 to 42 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: R109XY031MO - Wet Floodplain Prairie
Hydric soil rating: No

Description of Quiver, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silty clay loam
Cg - 8 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F109XY037MO - Wet Floodplain Woodland
Hydric soil rating: Yes

Description of Nodaway, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 7 inches: silt loam
C - 7 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F109XY030MO - Loamy Floodplain Forest
Hydric soil rating: No

Minor Components

Colo, occasionally flooded

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R109XY031MO - Wet Floodplain Prairie
Hydric soil rating: Yes

Floris, occasionally flooded

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F109XY030MO - Loamy Floodplain Forest
Hydric soil rating: No

Zook, occasionally flooded, ponded

Percent of map unit: 5 percent
Landform: Oxbows
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R109XY032MO - Ponded Floodplain Prairie
Hydric soil rating: Yes

831C2—Pershing silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2vcvf
Elevation: 660 to 980 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Pershing, moderately eroded, terrace, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pershing, Moderately Eroded, Terrace

Setting

Landform: Stream terraces
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 4 inches: silty clay loam
BE - 4 to 12 inches: silty clay loam
Bt - 12 to 55 inches: silty clay
BC - 55 to 79 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 12 to 16 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R109XY036MO - Wet Loess High Terrace Savanna
Hydric soil rating: No

Minor Components

Caleb, moderately eroded, terrace
Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

Pershing, severely eroded, terrace
Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY036MO - Wet Loess High Terrace Savanna
Hydric soil rating: No

832C2—Weller silty clay loam, terrace, 5 to 9 percent slopes, moderately eroded

Map Unit Setting
National map unit symbol: 2tkbs
Elevation: 550 to 1,350 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Weller, moderately eroded, terrace, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Weller, Moderately Eroded, Terrace

Setting
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, riser
Down-slope shape: Convex

Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
BE - 7 to 18 inches: silty clay loam
Bt1 - 18 to 25 inches: silty clay
Bt2 - 25 to 67 inches: silty clay loam
BC - 67 to 79 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: F109XY019MO - Loess High Terrace Woodland
Hydric soil rating: No

Minor Components

Douds, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope, riser
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

Galland, moderately eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, riser
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R109XY018MO - Loamy Footslope Savanna
Hydric soil rating: No

S732C2—Weller silty clay loam, 5 to 9 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2tkbk
Elevation: 530 to 1,350 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 174 to 209 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Weller, moderately eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Weller, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
BE - 7 to 18 inches: silty clay loam
Bt1 - 18 to 25 inches: silty clay
Bt2 - 25 to 67 inches: silty clay loam
BC - 67 to 79 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D

Ecological site: F109XY003MO - Loess Upland Woodland
Hydric soil rating: No

Minor Components

Keswick, moderately eroded
Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F109XY007MO - Till Upland Woodland
Hydric soil rating: No

Ashgrove, moderately eroded
Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F109XY007MO - Till Upland Woodland
Hydric soil rating: Yes

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